Popular Astronomy.

Vol. XXXV, No. 10 DECEMBER, 1927 Whole No. 350

SARAH FRANCES WHITING.

By ANNIE J. CANNON.

The young women of today to whom all doors are ajar can scarcely realize the difficulties or experience the enthusiasm of those who more than half a century ago pushed open the doors of opportunity in the various departments of learning.

On September 12, 1927, Sarah Frances Whiting, professor emeritus of physics and astronomy at Wellesley College, passed out of this life at her home in Wilbraham, Massachusetts. She had the distinction of establishing at Wellesley College the departments of physics and astronomy, in both of which she was apparently the first to introduce laboratory experiments for women. Born at Wyoming, N. Y., in 1846, she inherited some of the best principles of colonial days. Her father was a direct descendant of Elder Brewster of the *Mayflower* on his mother's side, and on his father's, of pioneer settlers in Vermont. A graduate of Hamilton College, he was successively the principal of several New York State Academies, so that Miss Whiting was reared in a scholastic atmosphere. Her education was directed by her father from her youngest days until she graduated from Ingham University in LeRoy, New York, in 1864. She took up teaching for her life-work, first at Ingham, and then in Brooklyn.

Miss Whiting said, "I was really started on my scientific career by some lectures, brilliantly illustrated, given in Brooklyn by Professor Barker of the University of Pennsylvania; also some lectures taking in astronomy, by Morton of the Stevens Institute, given in the New York Academy of Music, on a great scale; also by a lecture on the eclipse of 1869, the Kentucky eclipse. These had fascinated me with the application of the spectroscope to astronomy."

When Wellesley College opened in 1875, the great new era of physics and astronomy was just beginning. Photography and the chemical analysis of light were in their infancy. The air was full of new methods for solving world-old problems. Among the pioneers there stands forth Edward C. Pickering, at that time professor of physics at the Massachusetts Institute of Technology, where he had already established the first physical laboratory for students in America.

This new method of teaching attracted Mr. Durant, the founder of Wellesley College, who had resolved that the classics and the sciences

should stand on equal footing in his great adventure where there were to be

> "Prudes for proctors, dowagers for deans
> And sweet girl graduates in their golden hair."

Herein was his dilemma. Where was it possible to find a woman capable of introducing laboratory physics into his new college? Men only were admitted to the Institute of Technology. He began to wonder whether, by any chance, a woman might be allowed there as a guest and so learn something of this new method. He therefore called on Professor Pickering and asked some such question which was answered in the affirmative with the spirit of chivalry and helpfulness ever characteristic of that gentleman.

It was not long before Miss Whiting had been induced to leave Brooklyn Heights Seminary, where she was teaching mathematics and the classics, and undertake the establishment of this new department at Wellesley. All sorts of novel things had to be done during that busy year. Four times each week she went to Boston and sat as a guest during Professor Pickering's lectures and watched the manipulation of the instruments.

No provision had been made for anything like a physical laboratory in Wellesley's new College Hall, one-eighth of a mile long, crowning the hill above Lake Waban. So the organ loft and great garret at one end of the fifth floor were converted into a place where for the first time young women in large numbers were to perform experiments in light, heat, and electricity. All of the instruments had to be bought, put together, and set up in this new laboratory. Many of Professor Pickering's smaller pieces of apparatus were of his own designing, and were made by artisans living in attics in the old narrow alley-ways of Boston. When Miss Whiting wished to order any of these instruments for Wellesley, Mr. Durant invariably accompanied her to the shops and introduced her to the workmen.

The Centennial Exposition in the summer of 1876 was a great help to her, for there under the guidance of Dr. Henry Draper (whose widow was later the generous benefactress of the Harvard Observatory) she saw her first dynamo, telephone, and incandescent electric light.

Since all physical apparatus was made abroad in those days, and no catalogues were issued, there was but one way for Miss Whiting to select the apparatus needed at Wellesley and that was to visit the laboratories of various colleges and institutes. She was always treated courteously, although she said she often "found it nerve-racking to be in places where women were really not expected to be, and to do things which women had not done before."

One astonished professor declared that he had never dreamed of discussing the Wheatstone Bridge with a lady!

All of her natural mechanical ingenuity was required to fit together the instruments, packed in many pieces, and to set them up so that they would perform successfully before her classes; and her classes were large, for physics was required of all students in those early days.

In that garret-laboratory which went up in smoke with all of College Hall in 1914, Miss Whiting had the pleasure of doing many interesting things, none of which perhaps was more exciting than her early experiments with the X-rays. After reading in a Boston morning paper of the existence and discovery of these Röntgen rays, she immediately set up an old Crookes' tube. A picture hook and a coin within a flat purse were placed over a photographic plate in its holder, slide inserted, and, after the holder was wrapped in black cloth, an exposure was made to the rays emanating from the tube. What uncanny feelings the shadows of that picture hook and coin produced on those who developed that first plate! Later experiments included the photography of the bones of the hand and arm.

Miss Whiting and Her Class in Advanced Physics, 1895-96.

Lectures on astronomy were started by Miss Whiting in 1879. Professor Pickering, who had by that time become Director of Harvard Observatory, invited her to keep in touch with the new work going on there, and thus her interest in astronomy was continually increased. She

let no striking astronomical event pass without arousing the attention of the whole college. Morning after morning, she marshalled the girls to balcony or porch roof to see the Great Comet of 1882 in all its splendor. And in December of that year, she observed and explained to many the transit of Venus.

But the astronomical department slumbered on for twenty years with no equipment save a celestial globe and a portable 4-inch Browning telescope. All this time, however, Miss Whiting was dreaming of an observatory with the best possible instruments for teaching. About 1898 she heard of a telescope for sale, a Clark 12-inch glass in excellent condition, made for Mr. S. V. White of Brooklyn. She had taken her pupils to look through this telescope when she was teaching in Brooklyn and she knew that it was then considered the finest glass in the vicinity. She longed to secure it for Wellesley, and thought perhaps the alumnae might undertake its purchase.

Meanwhile a Commencement season came around, and on the occasion of "Float" night, she invited a party for supper at her house of residence. Among the guests was a trustee of the college, Mrs. John C. Whitin of Whitinsville, Massachusetts. There were also four members of the staff of Harvard Observatory. The subject of Wellesley's urgent need of a telescope and an observatory was discussed with great animation during that supper while nobody realized that there sat the fairy godmother who had been interested in the stars from childhood, and who was already thinking of doing something for the College Beautiful. That very night while the Observatory party was trolleying back to Cambridge, Mrs. Whitin "acting on an impulse," she said, was taking up with Professor Whiting the matter of purchasing the telescope.

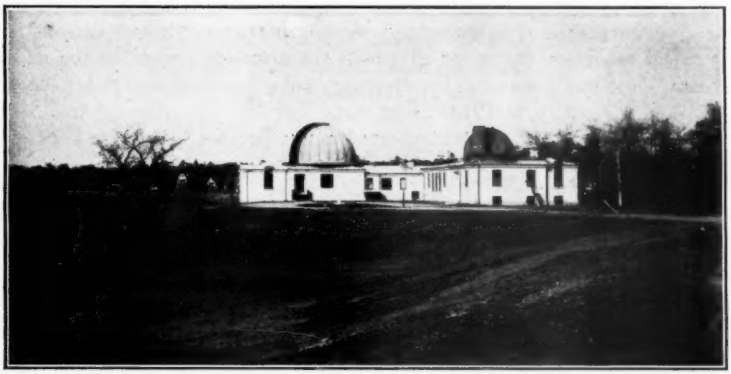
Before many months, the new Observatory began to rise on one of Wellesley's hills. It must be of white marble, said the donor, for white is symbolic of this project: *White, Whitin, Whiting,* owner, donor, and professor. And it may be added that the first assistant happened to be named *Whiteside.*

An abiding friendship grew up between the two women during the days of planning and construction. What happy times it brought to them, enjoying, as they did, such varied pleasures as evening visits to see the moonlight streaming over the white marble walls before the roof was put on, or the first peeps through the telescope, or the distinguished gathering on the day of dedication, or the entertainment of the American Astronomical Society and the foreign visitors in 1910.

The Observatory is not only beautiful, but is also excellently equipped for teaching purposes. The 12-inch equatorial is supplemented by a 6-inch Clark telescope, a Bainberg Broken Transit, a Browning spectroscope, an Evershed spectroscope, a Rowland concave grating spectroscope, a Warner and Swazey chronograph, and a Howard sidereal clock,

besides a number of smaller instruments and apparatus for students' work.

Retiring from the department of physics in 1912, Miss Whiting devoted all of her time to her duties as Professor of Astronomy and Director of the Observatory. Inspired, as she said, by Professor Pickering, she was the first to institute day-time laboratory work in astronomy by means of photographs of celestial objects. Later she published these exercises in a little book, "Day-time and Evening Exercises in Astronomy," in which photographic studies of the light curves of variable stars and of stellar spectra take their place beside visual observations of the moon, planets, and stars.



WHITIN OBSERVATORY, WELLESLEY COLLEGE,
WELLESLEY, MASS.

The social side of Miss Whiting's character was strongly developed. During several visits abroad she made a wide acquaintance with scientific people. As early as 1888, she visited all the great English physical laboratories. In Glasgow, where Sir William and Lady Thomson entertained her, she noticed that he (Lord Kelvin) seemed "neither surprised nor alarmed that a woman should devote herself to physics." To offset this, however, there was Sir William Crookes (of the Cathode rays) who, after showing her his laboratory, asked very earnestly, "If all the ladies should know so much about spectroscopes, who would attend to the buttons and the breakfasts?"

It was in 1896 that she studied under Tate in Edinburgh and visited German laboratories. During this visit, also, she was frequently invited to Tulse Hill where in the garden Observatory Sir William Huggins had laid the foundations of astrophysics, and where Lady Huggins graced that hospitable home filled with treasures of all sorts. What acquaintance could have given her more pleasure? For of all branches of physics and astronomy, she was most keen on the spectroscopic de-

velopment. Even at her Observatory receptions, she always had the spectra of various elements on exhibition. So great was her interest in the subject that she infused into the mind of her pupil who is writing these lines, a desire to continue the investigation of spectra.

Lady Huggins, that rare character who headed her letters "Dieu; — et mes Amis," and Professor Whiting, who always retained the sentiment of life, formed a warm friendship cemented by much correspondence and occasional visits until the death of the former in 1915. Because of this friendship, Lady Huggins bequeathed to Wellesley College seven hundred valuable books, fifty pictures, a collection of historic jewelry and embroideries, and twelve small astronomical instruments.

Professor Whiting was a member of the American Association for the Advancement of Science, and of the American Physical and Astronomical Societies, the latter of which she attended regularly for many years. She was present at the meeting of the International Solar Union in Bonn, Germany, in 1913.

In 1905, Tufts College conferred upon her an honorary D.Sc. in recognition of her contributions to the teaching of physics and astronomy.

She fitted many women for teachers and responsible positions, and followed their careers with the greatest interest. She ever strove to inspire her pupils to become not only good scholars, but women of influence in their communities.

For many years the hostess of College Hall, she had much experience with dignified entertaining, for it was her duty to welcome the distinguished guests and to give receptions to groups of varied character; perhaps for the first Japanese students sent to this country, or the Boston Microscopical Society, or for some renowned foreigner like Matthew Arnold.

When she and her sister moved into the attractive Observatory house, constant and delightful hospitality was extended to students, alumnae, and many friends. Rarely a week-end, to say the least, when that guest-room was not occupied! No one who visited them can lose the feeling of the uplifting spiritual atmosphere of that home, for the religious element was one of the strongest of her nature. It appeared to raise her above every-day trials, so that she was always calm and serene as if upheld by some hidden source of joy and comfort.

After forty years of teaching at Wellesley, serving under the administrations of all six presidents, she retired in 1916, and made a home in Wilbraham, Massachusetts, with her sister and a former Wellesley associate. Always an indefatigable worker, she kept busy almost to the end, whether it were gardening, or giving a science talk, or teaching a Bible class, in Wilbraham or during her winters in the Southland.

The memories of her rich and happy life were constantly with her; of the great advance of the higher education of women, and of the col-

lege she loved, of the marvellous developments of physics and astronomy, of the delightful associations with her co-workers, pupils, and friends. Happy in such retrospect, she went calmly forward, upheld by an abiding faith in immortality, and firmly believing in a great overruling Power as expressed in the closing words of the "Paradiso" which she had engraved over the hearth-fire of Whitin Observatory House,

"Love rules the Sun in Heaven, and all the Stars."

HARVARD COLLEGE OBSERVATORY.

THE AMERICAN SECTION OF THE INTERNATIONAL ASTRONOMICAL UNION.

By RAYMOND S. DUGAN.

The third General Assembly of the International Astronomical Union will be held at Leiden, Holland, commencing July 5, 1928. The Union was organized at Brussels in 1919, and meetings have been held at Rome, in 1922, and at Cambridge, England, in 1925. The objects of the Union are, (1) "To facilitate the relations between astronomers of different countries where international co-operation is necessary or useful" and (2) "To promote the study of astronomy in all its departments." Much of the business of the meeting is handled by the standing committees representing the various branches of astronomy. At the general meetings the committee reports and proposals submitted by the national committees are discussed. No papers of individual research are presented.

The Union is chartered under the auspices of the International Research Council, and each country is represented by a national committee "formed under the responsibility of the principal academy of the country concerned, or of its National Research Council, or of some other national institution or association of institutions, or of its Government." The American national committee, or, as it is called, the American Section was organized in 1919 as a committee of the Division of Physical Sciences of the National Research Council.

The Executive Committee of the American Section is a permanent body made up of the astronomical members of the Division of Physical Sciences and (*ex officio*) of the President and Secretary of the American Astronomical Society. The present personnel is Harlow Shapley, *Chairman;* C. G. Abbot, G. C. Comstock, Frank Schlesinger, Joel Stebbins, and R. S. Dugan, *Secretary*.

The American Section is composed of all astronomers and other scientific men who are members of the American technical committees appointed by the Executive Committee. The American Section, ex-

cepting the Executive Committee, goes out of existence at the close of the corresponding triennial meeting of the Union, and the Executive Committee is charged with the duty of organizing the Section and arranging for a meeting shortly before the meeting of the Union, and to select delegates.

In preparation for the meeting at Leiden, the Executive Committee met in September, 1927, at Madison, Wisconsin, and appointed committees of American astronomers corresponding to the international committees. The chairmen of committees were requested to send to the secretary reports, if such were deemed advisable, to be presented to the Section. It was advised, however, that these should not be reports of progress of American astronomy, but, rather, should be confined to matters of international import which might be brought to the attention of the Union for discussion. It is hoped that the reports also of some of the international committees which have American chairmen will be in preliminary form by the time of the meeting and can be presented for discussion.

The meeting of the American Section will be held about December 31, 1927, at New Haven, immediately following the completion of the program of the American Astronomical Society. Such reports and proposals as are adopted at that time will be forwarded to the secretary of the International Astronomical Union for inclusion in the agenda of the meeting of the Union.

It has been the policy of the Executive Committee to appoint any American astronomer in good standing as a delegate to the meeting of the Union. Those intending to attend the meeting at Leiden are requested to so inform the secretary.

Following is the list of committees of the American Section, the numbers corresponding to those of the international committees:

3. *Committee on Notation, Units, and Economy of Publication.*—E. B. Frost, *Chairman;* R. G. Aitken, Benjamin Boss, W. J. Humphreys, A. O. Leuschner, Frank Schlesinger, H. C. Wilson.
4. *Committee on Ephemerides.*—W. S. Eichelberger, *Chairman;* E. W. Brown.
8. *Committee on Meridian Astronomy.*—Benjamin Boss, *Chairman;* J. C. Hammond, H. M. Jeffers, F. B. Littell, J. G. Porter, Frank Schlesinger, R. H. Tucker.
12. *Committee on Solar Physics.*—C. E. St. John, *Chairman;* C. G. Abbot, L. A. Bauer, Philip Fox, G. E. Hale, O. J. Lee, J. A. Miller, S. A. Mitchell, S. B. Nicholson, Edison Pettit.
14. *Committee on Standards of Wave-Length and Tables of the Solar Spectrum.*—H. D. Babcock, *Chairman;* Sebastian Albrecht, Keivin Burns, A. S. King, W. F. Meggers, C. E. St. John.
16. *Committee on Physical Observations of the Planets, Comets, and Satellites.*—F. E. Ross, *Chairman;* Leon Campbell, Margaret Harwood, S. B. Nicholson, W. H. Pickering, E. C. Slipher, Robert Trumpler.
19. *Committee on the Variation of Latitude.*—W. D. Lambert, *Chairman;* E. W. Brown, A. C. Lawson, F. B. Littell, F. E. Ross, Frank Schlesinger.
20. *Committee on Asteroids, Comets, and Satellites.*—A. O. Leuschner, *Chair-*

man; R. G. Aitken, E. W. Brown, C. H. Gingrich, W. K. Green, G. H. Peters, George Van Biesbroeck.

22. *Committee on Meteors.*—C. P. Olivier, *Chairman;* W. J. Fisher, G. P. Merrill, W. H. Pickering.

24. *Committee on Stellar Parallaxes and Proper Motions.*—Frank Schlesinger, *Chairman;* W. S. Adams, H. D. Curtis, W. S. Eichelberger, Philip Fox, O. J. Lee, W. J. Luyten, J. A. Miller, S. A. Mitchell, F. E. Ross, H. N. Russell, Harlow Shapley, Frederick Slocum, Adrian van Maanen.

25. *Committee on Stellar Photometry.*—F. H. Seares, *Chairman;* E. S. King, C. E. K. Mees, F. E. Ross, Harlow Shapley, Joel Stebbins.

26. *Committee on Double Stars.*—R. G. Aitken, *Chairman;* G. C. Comstock, Philip Fox, C. P. Olivier, H. N. Russell, George Van Biesbroeck.

27. *Committee on Variable Stars.*—Harlow Shapley, *Chairman;* R. H. Baker, Leon Campbell, Annie J. Cannon, R. S. Dugan, Caroline E. Furness, F. C. Jordan, D. B. McLaughlin, P. W. Merrill, S. A. Mitchell, W. T. Olcott, H. N. Russell, Jan Schilt, C. L. Stearns, Joel Stebbins, R. E. Wilson.

28. *Committee on Nebulae and Stellar Clusters.*—V. M. Slipher, *Chairman;* S. I. Bailey, H. D. Curtis, E. P. Hubble, C. O. Lampland, Harlow Shapley, Adrian van Maanen, W. H. Wright.

29. *Committee on Spectral Classification of Stars.*—W. S. Adams, *Chairman;* Annie J. Cannon, R. H. Curtiss, P. W. Merrill, Cecilia H. Payne, H. N. Russell, Harlow Shapley, W. H. Wright.

30. *Committee on Stellar Radial Velocities.*—W. W. Campbell, *Chairman;* W. S. Adams, R. H. Curtiss, E. B. Frost, A. H. Joy, J. H. Moore, V. M. Slipher.

Committee on Observations of the Position of the Moon and Changes in the Length of the Day.—E. W. Brown, *Chairman;* W. D. Lambert, G. H. Peters, J. Ernest G. Yalden.

OBSERVATIONS OF THE SHORT-PERIOD VARIABLE AK HERCULIS.

By W. W. MORGAN.

The variable star AK Herculis ($\alpha = 17^h\,7^m$, $\delta = +16°\,32'$; 1855) was discovered in 1917 by Joel H. Metcalf.[1] It was given the provisional designation of 33.1917, and was not assigned a definite name until 1924. Esch[2] found the period to be $0^d.210758$, later[3] revised to $0^d.210760$, and the range of variation to be from $8^M.2$ to $8^M.9$. He used comparison stars of which Graff[4] had determined the photometric magnitudes. Esch concluded that the variation is not regular enough to place the star in the β Lyrae class, and indicated the possibility of there being a flat secondary minimum. On the other hand, F. C. Jordan stated[5] that the variable is of the β Lyrae class with unequal minima and a period of $0^d.421519$, double the one found by Esch. Jordan gives the photographic magnitude at maximum as $8^M.28$, at primary minimum as $8^M.90$, and at secondary minimum as $8^M.72$. This would give a total

[1] *Harvard Circular*, No. 201, 1917.

[2] *Beobachtungs-Zirkulare der Astronomischen Nachrichten*, **4**, 41, 1922.

[3] *Ibid.*, **6**, 8, 1924. [4] *Ibid.*, **5**, 52, 1923.

[5] *Astronomische Nachrichten*, **219**, 403, 1923.

range of $0^{M}.62$. He also states that the light at maximum is constant for about $0^{d}.05$.

Ninety-eight observations of the variable were made by the writer by the method of Argelander with the 3-inch Petitdidier finder of the 12-inch equatorial of the Yerkes Observatory between April 19 and May 4, 1927. The comparison stars used are listed below. The magnitudes are those photometrically determined by Graff. The brightness of the stars in steps was found by combining all the observations. In doing this a striking example of the Dove effect was noticed. On nights when there was no moon the star B.D. +16°3128 seemed to be equal to, or even slightly brighter than, B.D. +16°3123, but on nights when the moonlight was strong the latter appeared two or three steps brighter. The spectrum of the first star is of class A2, and that of the second F8.

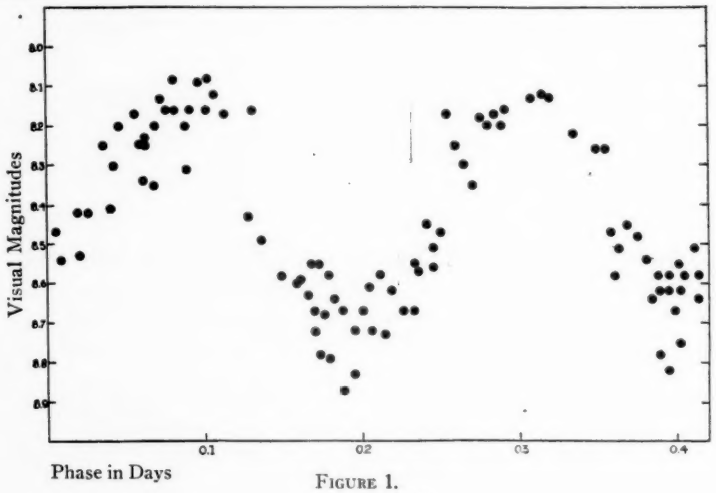


FIGURE 1.

COMPARISON STARS.

B.D.	Sp. (H.D.)	Magnitude	Steps
+16°3139	A0	7.68	17.8
17°3213	K5		16.1
16°3120	K0	8.43	9.3
16°3123	F8	8.68	4.1
16°3128	A2		3.7
+16°3124	G0	9.13	0.0

The variable itself, according to H.D., is of spectral class F8. The magnitudes were plotted as abscissas and the steps as ordinates and a straight line was drawn through the points. From this line, the brightness of the variable, which had been found in steps, was converted into magnitudes.

The observations of the variable were divided into twenty groups, of

which nineteen had five observations and one three. These are, according to phase:

OBSERVATIONS.

Phase d	Magnitude M	Phase d	Magnitude M
0.017	8.47	0.212	8.66
.045	8.27	.234	8.58
.063	8.29	.252	8.39
.077	8.14	.276	8.24
.094	8.18	.305	8.14
.116	8.19	.352	8.35
.155	8.58	.374	8.53
.171	8.66	.391	8.68
.181	8.68	.400	8.63
0.194	8.75	0.411	8.57

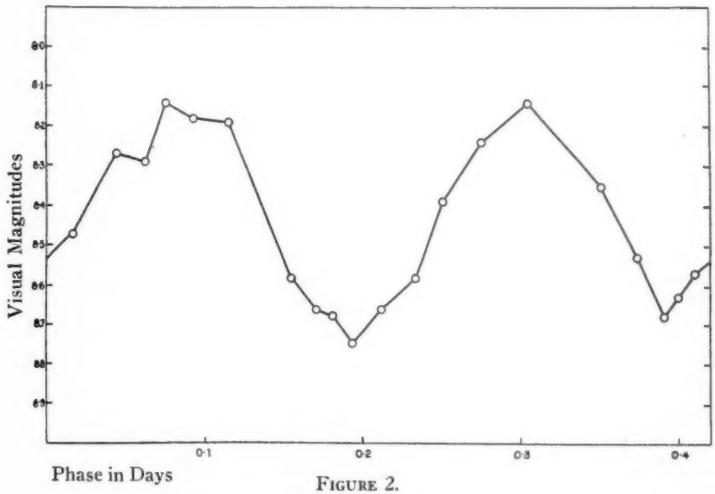


FIGURE 2.

The separate observations are plotted in Figure 1 and the groups in Figure 2.

From the light curve, the maximum is $8^{M}.16$ and the minimum $8^{M}.71$, giving a range of $0^{M}.55$, an amplitude almost exactly the same as that between the maximum and the mean of the two minima as given by Jordan. These observations give no certain evidence that the minima are unequal; nor does it seem that there is a stationary period at maximum. There is a possibility that the minima might be unequal photographically and equal visually. If one of the two stars of which the variable is composed were of spectral type F5 and the other of G5 and if the minima were equal visually, they would be slightly different in the photographic rays, depending upon which star was eclipsing the other. The eclipse is not total, as only 40 per cent of the total light is lost at the time of minimum.

The observations fit the period $0^d.421519$ well, the difference between the observed and computed maxima being less than the uncertainty of observation.

YERKES OBSERVATORY,
WILLIAMS BAY, WIS., JULY 14, 1927.

THE ASTRONOMICAL FRATERNITY OF THE WORLD.

By DAVID B. PICKERING.

PART IV.

It was in the spring of this year that I again stepped through the familiar iron gate-way of the grounds of the Paris Observatory; traversed the silent, dark spaces of the ground floor of the great building and mounted the ghost-like spiral stairs in search of that small placard whose legend "Laboratoire d'Optique Dina" had so intrigued me the preceding summer. This visit, however, held little of the glamour of exciting adventure that had marked the former occasion, for rumors that had long been abroad, of altered relations and changed conditions, had finally been confirmed. Within the laboratory were the well-remembered constructive devices, but not now so actively employed. There appeared at first to be no one about but soon, from a side room, came a smock-clad, pleasant young man who introduced himself as Monsieur Couder, who, I later learned, had been one of Professor Ritchey's staff. From him we heard with regret that Professor Ritchey, since the expiration of his contract with Mr. Dina, had been ill and was now taking a much needed rest at his home; also that the venerable Dr. Baillaud had retired from the active directorship of the Observatory, with the title "Honorary President" and had been succeeded by M. Deslandres who is also director of the Meudon Observatory. M. Couder explained that he himself was now employed by Mr. Dina, and exhibited a telescope in course of construction which the latter had commissioned him to build.

There, placed in its temporary tube, was an eighty centimeter solid mirror—a far less imposing thing than even the least of the entrancing experimental cellular creations upon which Professor Ritchey had so recently been engaged and which were to be but the precursors of a majestic giant whose light-collecting power would have been over sixteen times that of the one now being constructed.

The latter is to be of the Schwartzschild type—a compact equatorial with short tube but whose secondary mirror would be larger and flatter than that originally planned by Professor Ritchey. This would reduce the total amount of light received twenty-two per cent as against seventeen in the case of the Ritchey-Chrétien. Its maker hoped thus to ob-

tain a field of three degrees and star images of not more than 0".7 diameter. M. Couder also has his dreams of the ideal telescopic site, for he expounded upon the glories of the atmosphere in that high area of Southern France, bounded by Digne, Barreme, and Mezel. There, at an altitude of two to three thousand feet, he said the rain fell as infrequently as at Mt. Wilson; and that there, where he had never seen a sign of disturbing dew, he had made splendid observations of lunar craters when the moon was half hidden by the horizon. I pondered much upon leaving the scene of this interview, as to what might be the outcome of this second and much modified plan.

Passing in the spring sunshine of Paris down the broad Rue Mt. Parnasse, I came to the apartment of Professor Ritchey and found that gentleman convalescing from the illness that had kept him at home for a fortnight. Seated in their sun-lit drawing-room together with Mrs. Ritchey and their daughter—their son having long since gone back to America—Professor Ritchey reviewed the final chapter of the story of the big adventure. Tired in body and mind, he was now having his first respite in over two years from the high pressure strain of continuous exertion. One could well hazard a guess that the vision of his orange grove—six thousand miles away—became daily more alluring. Since the expiration of his contract with Mr. Dina, and the abandonment of the plans for building the great telescope, he had been engaged in the construction of two 20-inch mirrors—one of the old, and one of the new cellular type—for the Paris Observatory. This institution was highly interested in having a test made of their relative merits, and this test Professor Ritchey had agreed to make, planning to return to America after the completion of the experiment. It was very evident that despite the tender sympathy and care of his good wife, she had been unable to stem the fierce tide of his energy, which seemed to be wearing down the tireless human machine. Half seriously I admonished her to assert her authority, to insist upon an occasional respite, to force the machine into low gear once in a while. Smilingly she promised—but I know his will—and, I wonder.

The train journey, down the beautiful valley of the Rhone from Paris to Lyon was a delight; especially so, since the tourist season had not begun and our compartment was spacious and comfortable. The sun-lit hills and valleys through which we wound were splashed with the shadows of occasional high billowy clouds.

It must have been that the weather was too good to last, for the day ended with our arrival at Lyon in a misty drizzle, shrouding the third city of France in a very unnecessary gloom, for we found it dull enough at its best—a great uninteresting, unbeautiful hive of factories and commercial fairs; one of the latter, with its exhibition of blue and red farm implements, was in very damp progress beneath the window of our hotel. Every train dumped its load of rural humans out upon the platforms of the great terminal, whence they poured down the wide steps

and spread across the plaza below, like black sand from the end of a funnel. But it was not to see Lyon, or its silk mills, or its fairs, that we had come to this place in eastern France, but to visit the Observatory at Saint Genis-Laval. Thence we journeyed through the mist, early next morning, jolting in our taxi over cobbled streets to this little suburb that lay, high and rather bare, four kilometers from the center of the big city. We could have gone by tram had we known it, and with greater comfort, as we found on our return. At the center of Saint Genis-Laval, our Jehu diverged from the car tracks and plunged between high stone walls that flanked a narrow dirt by-road, which wound and twisted upward, reminding one strongly of southern Italy. On the top of a nearby hill stands the "Observatoire de Lyon," built in 1877 to replace the older one at the Jesuit College.

Upon pulling the knob at the wooden door, that flanked an iron gate, a far-off bell jingled faintly, and, in time, an attendant admitted us and we were conducted to the large residence building within the grounds.

Here, in the big, high-ceilinged combination living-room and office, we found Professor Jean Mascart, the Director, and, once in the company of this short, sandy-bearded, vivacious and jovial individual, forgot completely the dullness of Lyon and the weather. We had yet to meet a European astronomer, without a sense of humor, but here seemed the merriest of them all. We caught him in morning negligee—but what cared he; he did us the compliment of greeting us as he was —like old friends who would understand that sort of thing. Then came Mrs. Mascart—a pleasant, kindly matron, with just enough dignity to complement the joviality of her husband. With her came three sturdy daughters, whose ages ranged from twelve to sixteen years, and whose braids of long, thick, tawny hair and sensible clothing showed at once that the influence of the bobbed-haired and flimsily-costumed flapper had not penetrated to the heights of Saint Genis-Laval. These girls, privately tutored at home, gave evidence of the good discipline and wholesome influence of family life and association. They have a big brother of twenty-seven, who lives in Paris, and who is soon to be married.

What a big, comfortable domicile this home was with its three stories of high-ceilinged rooms. A large drawing-room, with billiard-room adjoining, is back of the living room, while the dining-room is below stairs, looking out upon the garden in the rear. Quantities of books occupied the wall spaces of the room in which we met, and we learned that the collecting of these was a hobby of the Director. Such a merry time we had trying to make ourselves understood; our host and his family spoke as little English as we spoke French, while both sides had a bit of German. Each sentence would contain something of the three languages. Professor Mascart would continually bring to his aid a little, well-worn Anglo-French dictionary, which he would pull from an upper pocket with the oft-repeated phrase "Just a minute." How

he enjoyed our struggles with his language, and with what mock seriousness he told us that every word we uttered was entirely wrong.

Professor Mascart may be something over fifty years of age. He had come here from the staff of the Paris Observatory fifteen years ago, and

PROFESSOR MASCART, MRS. MASCART, AND THEIR DAUGHTERS.

he told us much of the work upon which he had been engaged since the beginning of his administration. Much of this has had to do with variable stars and the phenomena of the sun's surface. A meridian catalogue of variable stars had recently been completed at the Observatory, but as yet no funds were available for its publication. He presented me with a pamphlet, published but two months previously, entitled: "Projet de Bibliographie Astronomique," which he had been commissioned to prepare by the Astronomical Union. Very enthusiastically he recounted

his adventures in America, which he and Mrs. Mascart had visited in 1925. He told of going to Vancouver and of attending the conference at Dartmouth. He spoke of meeting Professors Frost and Parkhurst of Yerxes, Fox of Dearborn, and Schlesinger and Shapley in the East. He deplored the fact that Dr. Shapley wouldn't *try* to talk French. American tricks and mannerisms of speech amused him greatly and his inability to comprehend them gave him much concern. He said that there seemed to be but two classes of Americans: the "Buts" and the "Ands" and very drolly he tried to mimic the speech of those to whom he had listened, by stringing together many unintelligible syllables, interspersed at intervals with the above emphasized words: "—but—but —but" "—and—and—and."

During the serious moments—and it seemed rare to find such in the companionship of this jovial person—he said that despite the great instruments and institutions of America, he felt sure that Europe, with her more limited equipment, was doing her full share in the matter of scientific research.

We were now introduced to M. Grouiller, whom, for many reasons, I had looked forward to meeting, and he offered to show me the instruments before luncheon. Mrs. Mascart had hospitably asked us to partake of this repast, *en famille;* but the invitation was accompanied by a dire threat from the terrible Professor; we might partake of their *food* but not a drop of *wine* should we have. He and the good wife and the dutiful daughters—ah yes—they indeed would drink of the good Burgundy—and that before our very eyes—while we struggled with the common, colorless, insipid water. Here was the chance he had waited for, here was his revenge on Americans; for, was it not so that while he was in America—during his entire visit—*not a drop* of wine did he taste? not a drop could be procure? Ha! Ha! was not retribution just —and sweet? Mrs. Mascart protested with much embarrassment and as we left on our tour of inspection with M. Grouiller, we were almost ready to believe that he meant it—almost. M. Grouiller, a short, round-faced gentleman of about thirty-five years of age, was very quiet, very courteous but also very shy. He spoke a bit more English than the Director and his enthusiasm for the work he was doing caused some of the shyness to wear off during our progress through the various buildings of the Institution. We first visited the fine old equatorial Coudé of Gautier, with its 12-inch glass, which with the aid of a Wilsing photometer is used for variable star observations.

M. Grouiller was extremely interested in describing the tests which he has been making during the last six months, with a new photometer-colormeter attached to the big Coudé. The color intensity of the red variables is equalized with that of a red artificial star by the aid of a red wedge. Assuming that a star's temperature is in constant but inverse ratio to its depth of color, the amount of displacement required for the color equalization of various stars would tend to determine their

relative surface temperatures. He had been making color-temperature curves in the attempt to standardize his results and seemed well satisfied with them as far as he had gone. In another building was a 6-inch Zeiss refractor, to which was attached a wide angle camera. With this, using 60 minute exposures, they photograph the stars from 5th to 10th magnitude for chart purposes. The camera itself, with the aid of a huge ocular which presents a field of 2½ degrees, is splendid for the visual observation of Variables. We visited the much used meridian circles, one of which is an old 6-inch by Eichens and lastly inspected another 6-inch refractor which for fifty years has been functioning regularly upon the sun, whenever this luminary dared show its face, for purposes of recording the number, size, and position of the sun-spots.

This has been for some time the special work of Mlle. Bloch, the young woman to whom M. Grouiller now introduced us, and who explained that she had been able to carry on this solar examination during 300 days of the last year. We were deterred from viewing the coelostat and the various instruments for meteorological work by a discussion which now ensued of the work of the French variable star association—"L'Association Francaise d'Observateurs d'Etoiles Variables"—or, after our own manner of abbreviation, the A.F.O.E.V. This society now forms the third important body of amateur astronomers in Europe and America engaged in the work of observing and discussing the long period variable stars: The variable star section of the British Astronomical Association (B.A.A.), The American Association of Variable Star Observers (A.A.V.S.O.), and the A.F.O.E.V.

Those of us who have so long been interested in the work of the American society feel not a little pride in the fact that some years ago, we were approached by the good people of the Observatory at Lyon, who solicited our aid in forming an association along the lines of our own. This, of course, we gladly gave, describing our methods and loaning our charts and in a general way assuming a god-fatherly attitude toward this new-born child of science. Today, though as yet they have a limited number of observers, some of whose estimates are unnecessarily duplicated, they are receiving at times as many as 2000 observations of 200 stars per month. The *Bulletin de L'Observatoire de Lyon,* the official organ of the Observatory, in which their records are published, states that for the month of April, 16 observers contributed 1271 observations of 139 Variables.

This compares most favorably with the A.A.V.S.O. in its younger days. In time they will achieve the task of reducing the observations of each star to about two or three per month for each member, except, of course, those of the Irregular Variables, which require constant attention. This calls for delicate handling, since many sensitive young amateurs are ambitious to achieve a monthly list, long in observations, if short in stars.

It may be interesting to compare the results given above with those of

the A.A.V.S.O. for the same month: 36 observers contributed to the latter report 1409 observations of 334 Variables. Among the French observers one notes the names of Chandra and Houdard. The former, an East Indian, has long been a member of the "Old Guard" of the A.A.V.S.O., while the latter would often contribute to our lists during the sad years of the great war. So strong was his zeal for observing during that period that he succeeded in smuggling a small telescope into the very trenches and observed his beloved stars almost under the enemy's nightly fire. M. Grouiller expressed his appreciation of the aid they had received from America and showed me the blue-print charts which they now use. These are smaller than ours—perhaps four by five inches in size—and are made in four types, well adapted to the glasses of various powers, all having the Harvard photometric determination of values for the comparison stars.

They have been traced by M. Brun, one of their members who is an excellent draughtsman and a teacher in an elementary school in a town about one hundred miles from Lyon; the fortunate possessor of a 6-inch glass, with which he claims to be able to see stars of the 14th magnitude —quite beyond the theoretical limit of a glass of that aperture.

An eager summons to the mid-day meal eclipsed our feast of Variables, and we hastened to the big house and filed with the Mascarts into the cheery dining-room below stairs. Who can question the benefits to body and soul of a wholesome meal partaken of in the French fashion? The mind must be attuned to give meat and drink its full attention and the wheels of Time must cease to function and be forgotten. Appetite and digestion work leisurely together and easy, undisturbed discourse aids them both. Here each delicious dish must needs form a separate course and so the big brown omelette was followed by the celery saute and that by the spicy hassenpfeffer—that gamey dish of stewed hare for which I confess a great weakness. Then came the stewed cherries and the cheese and the cake. Our host, betimes, cut huge slices from the great loaf that rested upon its board at his side, as these were required. Each dish smacked of good home cooking, and the taste told of very expert preparation. And now we learned that M. Mascart had forgiven us for the sins of our country—for here he was, actually filling our glasses, though pretending to do it grudgingly, with that glorious, sour, red wine which like all the other delicacies, was prepared in the home. A long and merry session it was indeed, to be followed by coffee, cordial, and cigarettes in the formal drawing-room above. Professor Mascart "rolls his own" and despises the American brand of cigarette, even as heartily as I do the French, so with great good humor, we agreed to be quits on this subject.

It was late in the afternoon when we took our departure—in the same damp drizzle in which we had arrived. We went laden with messages of felicitations to our host's American friends, with the pleasurable satisfaction of having visited the scene of activities so closely related to

those of our own Association and of having met its promoters in such charming good-fellowship. As we tramped down the narrow, winding way to the town, between the rough stone walls that stretched high above our heads on either side, we passed a buxom lass trudging upward. Her head was unprotected from the rain and she carried a huge, unwrapped loaf beneath her arm—the veritable "staff of life" of her people. We thought she smiled at us in passing and looking back, waved her a farewell. It was our friend Mlle. Bloch, of sun-spot fame.

Entrance to the Observatory of Marseilles.

On a later day, we found ourselves in that ancient sea-port and second city of France, Marseilles, and lost ourselves for a time in the romance of its history and people. We wandered among the motley crowd of humans, dropped here from all the world, who for good or bad swarm about the section of the city adjacent to the wharves, at the foot of that famous street known as the Cannebiere. Here was that great basin of commerce, Vieux Port, whose mouth is crossed by the largest transporter bridge in the world, with its moving platform suspended but ten feet above the water.

We climbed to the heights of Notre-Dame-da-la-Garde, that church, surmounted by a colossal figure of the Virgin, which forms such a famous land-mark for sailors. From this eminence we looked down

across the white Corniche road that lies like a ribbon along the shore, and out across the blue bay to that faint island with its solitary castle, the Chateau d'If, from which Edmond Dante—that glorious hero of our youth—escaped to wreak his vengeance upon his enemies. Perhaps it was upon one of those very wave-washed rocks nearby, that he climbed after his very damp adventure, to proclaim to the listening elements "The world is mine."

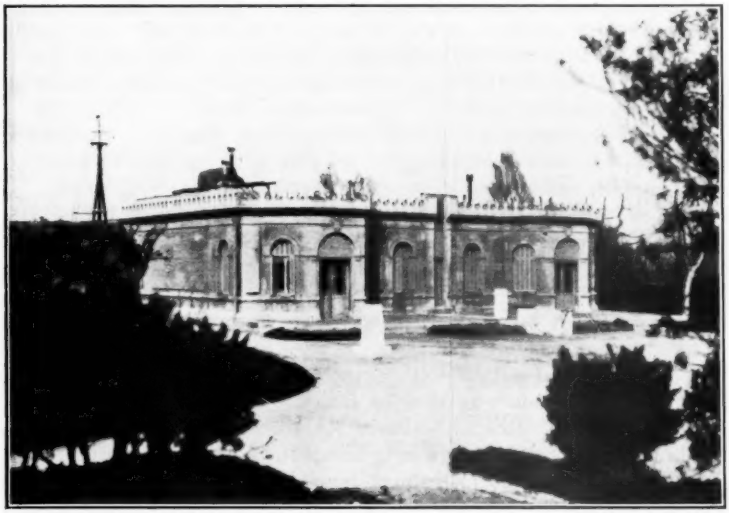
Never had we seen so many varieties of sea-food, served from so many street-stands, nor such enormous cheeses as the crowded markets displayed. Of course, we had to partake of the famous "Bouillebase"—that marvelous fish-stew which originated in Marseilles, but whose Parisian prototype Thackeray made immortal in poetry. One afternoon, tired from feasting upon the strange sights of this strange place and craving things astronomical, I sought number 2 Place Leverrier, whose iron gates stand close by Longchamps—that place of sculptured monuments that guards the entrance to the Zoological Gardens. The grounds of the "Observatoire de Marseilles" and those of the Zoo, adjoin in the rear, though from the Place Leverrier one sees only, high above the street, the plain but massive building wherein is the home of Professor Jean Bosler, the Director of the Observatory.

This institution was taken over from the Jesuits by the Ministry of the French navy, in 1749, and in 1869 the present buildings were erected. It was here that the famous Pons, long ago amused himself by discovering comet after comet. No one responded to my call when I pulled the big brass knob at the door of the great house, though it set a loud bell jangling somewhere far within, so I proceeded to wander along the paths that twisted among the palm trees and shrubbery of the grounds. An old gardener was trimming the long withey shoots from the many plane trees and gathering the faggots into piles. In an open grassy area, half a dozen boys, from twelve to fifteen years of age, were playing football. Ascending the winding path, I came upon two pill-box type telescope houses, while another, with sloping roof, obviously contained transit instruments.

There was also a low building, centrally located, that possibly contained offices and computing rooms. The chief instruments of the Observatory, I later learned, were the 32-inch Foucault reflector—the identical one that was used to measure the radial velocity of the Orion nebula—a 9½-inch Mertz Refractor, a transit circle of 7½ inches, and a spectro-helioscope which had been recently acquired from Nice.

Having failed to find anyone who could give me a closer view of the equipment than I could obtain by peering through an occasional window, I at last made friends with the group of boys, who had curiously been watching my progress about the grounds. What bright, courteous, manly chaps they proved to be, and what fun we had trying to unscramble our conversation. Each of the youngsters had solemnly resolved to visit New York some day and see those great buildings, at the

printed illustrations of which they had so often marveled. One of the boys proved to be Lucien Bosler—a son of the Director. He was a bright-eyed, sandy-haired lad of about thirteen. He explained that his father was away and would not return until evening, but expressed the hope that I might call to see him then.



Offices and Computing Rooms of the Observatory of Marseilles.

Accordingly, with my wife, I returned at eight. The great bell again jangled, many times, but with no better result than in the afternoon, but finding the door unbolted, we wandered in, and began negotiating the broad stairs, looking for a clew in the semi-darkness, that would lead us to the Bosler apartment. At last, far above stairs, a young lady, who proved to be the Director's daughter, admitted us into a most formal parlour, the exact arrangement of whose many colorful decorations bespoke someone's precise care. After a rather long interval we became aware, with some embarrassment that we had neglected to consider the customary length and lateness of the evening meal and had intruded unwittingly upon this important function. Our apprehensions were allayed, however, by the cordial greeting of the big, smiling man who now entered to meet us. Professor Bosler is tall and rather gaunt, with very dark hair and moustache and very bright eyes. He is of the type who would have made a picturesque hero of the frontier in our dime novel days. We were relieved to find that he spoke very good English, and that he stood on no formality, for he invited us at once into the snug sitting-room whose open fire, and cozy atmosphere was so in contrast to the striking formality of the drawing-room. Here we

met Mrs. Bosler, a rather somber, darkly clad lady who seemed distressed at her inability to converse with my wife during the long, loud, and animated conversation which ensued between Professor Bosler and myself—loud, necessarily, since Professor Bosler is extremely hard of hearing. The situation for the ladies was made less difficult by the presence of the young daughter who had admitted us, and the bright-eyed, freckled, smiling Lucien. Since the French schools make English and German compulsory, these two could act as interlocutors for the ladies; and that post-prandial symbol of native hospitality—cakes and cordial—gave us all a feeling of comfortable familiarity.

Besides the two children who were present, there is a daughter of nineteen, whose twin brother is in training with the navy at Brest, and a young lady of six, who was tucked away somewhere in her bed.

It seems quite certain that if scientific America ever compiles a list of her European admirers, the name of Jean Bosler—like that of Abou-Ben-Adhem—will be very near the top. No one whom we had met abroad evinced such enthusiasm for the men, the institutions, and the achievements of our country as he. Three times he has visited the United States, meeting Professor Chrétien at Mt. Wilson in 1910 during those days of patient toil on the big mirror. Professor Bosler served the observatory at Meudon for thirteen years, prior to spending three years on the staff of the Paris Observatory. He came to Marseilles in 1924. Thus far his work here has been largely determining proper motions with the Blick instrument, but the Director stated his desire to expand the scope and activity of the institution. He explained that the organization was preparing to enter upon a program of astrophysical work, to which end they were training the staff and looking for additional equipment. M. Rene Baillaud—a younger son of the ex-Director of the Paris Observatory—together with M. Paul Maitre and Mlle. Jasse are members of the staff. The Director spoke most highly of the latter, who is studying for a degree in physics to prepare her for the advanced work to be undertaken by the Observatory.

One is struck with Professor Bosler's versatility in those things astronomical which would naturally seem to lie beyond his horizon and with his wide knowledge of the "Small talk" of those who people this particular corner of the world of science. There is a sort of glowing enthusiasm and restlessness in the temperament of this man—apparently still under fifty—which gives promise of achievement. While he has always had a soft spot in his heart for that multitude of infant planets that conduct their wayward gambols beyond the stately orbit of Mars, he showed no less enthusiasm in discussing the mystery of the dark nebulae and waxed eloquent as he bespoke his admiration for the work of Edwin Hubble at Mt. Wilson, whose theories greatly appealed to him. He told of how closely he had followed the career of Nova Aquilae III over a long period; of his work on the Carte du Ciel—about which he evinced as little enthusiasm as did Father Hagen. But most

interesting of all was the recital of his experiences at Stromsund, Sweden, at the total eclipse of 1914, during which he discovered a new line in the spectrum of the corona, λ 6374.

During the telling of these adventures in science, which were often interspersed with discussions of some phases of the subject of especial mutual interest, we had ignored the ticking of the clock, nor realized that the evening had slipped away unawares. It was late when we made our adieus, and the good Professor went below with us to unlock the great gate that the concierge had secured for the night.

We elected to return to our hotel on foot—through the wide, wierd streets—so dark now, save for the moon—so silent and deserted. We were as thrilled as children at the thought that we were on the shores of the Mediterranean, in the oldest town of Western Europe. Thrilled also at the thought that to one of meagre knowledge, whose eligibility lay only in his love of the stars, these people of science, with patient kindliness, had extended the right hand of fellowship and welcomed him as a Brother into that Craft to whose work they had dedicated their lives.

AMERICAN ASTRONOMICAL SOCIETY.

REPORTS OF OBSERVATORIES 1926-1927

The reports which follow are for the twelve months ending June 30, 1927, unless otherwise noted.

ALLEGHENY OBSERVATORY

UNIVERSITY OF PITTSBURGH

PITTSBURGH, PENNSYLVANIA

As during the preceding six years, there have been no changes in personnel.

Considerably fewer plates (1,387) than usual have been taken with the Thaw Photographic Refractor during the year—due to several causes, among which may be mentioned an unusually poor winter observing season, the absence of one of the staff on other duty for six months, and the serious illness of another.

Of the three major programs being carried on at the Allegheny Observatory, stellar parallax continues to absorb the majority of the night hours available at the telescope. The number of parallaxes at present awaiting publication is 130, of which 70 are by Mr. Daniel, and 60 by Mrs. Crissman. In addition, 300 regions are completed and awaiting measurement.

Thanks to a grant of $600 from the National Academy of Sciences to pay a portion of the cost, it has been possible to make a start on the publication of Mr. Jordan's extensive program of extra-focal photome-

try. The first portion of his photometric volume, entitled *Light Curves of Twenty-nine Cepheid Variables,* was in type at the close of the period under report, although not distributed till later.

Mr. Burns spent six months at the Bureau of Standards in Washington, occupied mainly with investigations bearing on the co-operative program of standard solar wave-lengths being carried on by the Allegheny Observatory and the Bureau. The greater part of the observational work on this program has been completed, though there still remains considerable measurement, and several allied or subsidiary investigations are planned before the program may be regarded as completed. The region 5805-7142 A, by Mr. Burns (Allegheny) and Dr. Kiess (Bureau of Standards), was in type at the close of this period and has since been distributed, as well as the wave-lengths for the regions 3592-4107 A and 4761-5892 A, by Mr. Burns.

The Observatory instrument shop was augmented during the year by a number of greatly needed machine tools, new or second-hand, including a Walcott 18″x12′ lathe, a 26″x10′ lathe by the same maker, a No. 2½ Rockford milling machine, a 24″x24″x6′ Gray planer, as well as considerable accessory equipment.

Nearly five thousand visitors were entertained at the Observatory by Mr. W. R. Ludewig, under the provisions of the Frick Public Evening Service.

HEBER D. CURTIS, *Director.*

AMHERST COLLEGE OBSERVATORY
AMHERST, MASSACHUSETTS

During the last five years the Observatory has been reconditioned after its long period of inactivity.

A new photometer has been designed and built for use with the 18-inch refractor. The calibration of this instrument has been completed and results are in preparation for publication. The instrument is being used for the determination of magnitudes of comparison stars for the A.A.V.S.O. and for a study of the variability of asteroids. A new filar micrometer has also been purchased for the 18-inch and has been calibrated.

The teaching of five courses in astronomy in Amherst College limits seriously the time available for observational work.

WARREN K. GREEN, *Director.*

BUREAU OF STANDARDS
DEPARTMENT OF COMMERCE
WASHINGTON, D. C.
(For the year 1927)

For many years the Bureau of Standards has conducted investigations in coöperation with American observatories, and has also carried on a great deal of work in its own laboratories of interest to astronomers.

During the apparition of 1926 the Bureau, in coöperation with the Lowell Observatory, made radiometric measurements of Mars, following the work done in 1922 and 1924. The results of this investigation were published early in the present year as Scientific Paper No. 553, *Further Radiometric Measurements and Temperature Estimates of the Planet Mars, 1926,* by Coblentz and Lampland. This paper gives data on Martian temperatures under many conditions and for the first time explains the effect on radiometric measurements of clouds in the planet's atmosphere.

The investigation of solar spectrum wave-lengths, begun in coöperation with the Allegheny Observatory four years ago, was continued, wave-lengths of 400 lines in the yellow, orange, and red portions of the spectrum having been measured and published (*Publications of the Allegheny Observatory,* Vol. VI, No. 8, *Standard Solar Wave Lengths, 5805-7142 A,* by Burns and Kiess). Comparison of these solar values with laboratory values shows a red displacement of the solar lines as a function of their intensity, but the displacement appears to be somewhat smaller for the longer than for the shorter wave-lengths. If we assume that the intensity scale for the longer waves is the same as for the shorter, these results continue in contradiction to the explanation given by Einstein's theory of gravitation.

After four years of work with improved apparatus, the first results of the redetermination of the Newtonian constant of gravitation were obtained early in 1927. Five values have been obtained: 6.661, 6.661, 6.667, 6.667, and 6.664, giving as a mean 6.664×10^{-8} cm^3/gm. sec^2. Slight changes have been made in the apparatus and the work is being continued. (For description see *A Redetermination of the Newtonian Constant of Gravitation,* Paul R. Heyl; *Proceedings of the National Academy of Sciences,* Vol. 13, No. 8, p. 601; August, 1927.)

In a new, high-precision method of lens testing developed by the Bureau, the well-known Hartmann test has been modified to permit the interpretation of the aberrations of the lens, in terms of wave-length, by means of the diffraction effects of the apertures of the Hartmann diaphragm. An application previously reported referred to points on the axis of the lens. By this method the amount of deformation of the wave front for points off the axis is measured to less than one-tenth wave-length, and the effect of the presence of striae in the lens readily determined quantitatively, up to the present a very elusive effect. This method differs from other interferometric methods in that it can be applied to large telescopes without the necessity of having large auxiliary optical flats.

The first of three parts of a handbook on optical design, intended to lead to standardized methods, has been published as Scientific Paper No. 550, *Application of the Algebraic Aberration Equations to Optical Design,* by I. C. Gardner. This gives a complete treatment of the third order aberration equations, their method of application, and the general

deductions regarding lens design which may be drawn from them.

A large glass disk for a reflecting telescope has been cast by pouring the molten glass into a mold, which is at the same time an electrically heated annealing furnace. The disk is made of borosilicate crown glass and is approximately 70 inches in diameter, 12.5 inches thick, and weighs 4,000 pounds. The cast iron furnace (or mold) weighs 5 tons, and the insulation (sil-o-cel) about 2 tons. The glass was allowed to cool about 2°C per day as it approached the annealing temperature, and was then annealed at a constant temperature for six weeks, after which slow cooling has again been started. The whole process will take about 10 months, and since the disk was cast in May, it will not be cold until next February. The ultimate success of this experiment can not be determined until that time.

The Bureau's work on radio wave phenomena has included studies of fading and its correlation with other natural phenomena, such as terrestrial magnetism and electrical conditions on the sun. There appears to be a close connection between radio phenomena and the sun-spot cycle.

G. K. Burgess, *Director.*

UNIVERSITY OF CALIFORNIA

Berkeley Astronomical Department

Students' Observatory

The only material addition to the equipment of the Observatory has been a radio receiving set installed for receiving signals on the chronograph in connection with the World Longitude Campaign.

Assistant Professor C. D. Shane, who previously held a joint appointment in the Departments of Astronomy and Mathematics, was transferred to the Berkeley Astronomical Department on full time.

With the establishment of an R.O.T.C. Naval Unit at the University of California the Department has greatly expanded its instruction in navigation and nautical astronomy.

The Staff and several graduate students have as heretofore participated in the computations of planet and asteroid orbits. These have been published as usual in the *Lick Observatory Bulletins* and in the *Harvard College Observatory Announcement Cards.* Elements and ephemerides were published for Comet *f* 1926 (Comas Solà) by C. H. Smiley and Miss Margaret Holbrook, also by L. A. Brigham and Miss Katherine Prescott; for Comet *d* 1927 (Stearns) by H. Thiele; for Minor Planet Comas Solà (1927 AA) by R. S. Richardson, P. A. McNally, S.J., and Miss Elizabeth E. Sternberg.

Professors Crawford and Shane participated in the World Longitude Campaign. The results are published in *Publications of the Astronomical Society of the Pacific,* Vol. XXXIX, No. 231, October, 1927, and give a longitude by $0^s.1$ larger than that hitherto adopted.

W. F. Meyer has continued the work, begun at the Lick Observatory

during the preceding year as exchange professor, of reobserving the radial velocities of a number of stars that have hitherto been considered spectroscopic binaries but should be eliminated from the list of spectroscopic binaries on the basis of his recent observations and a re-reduction of earlier observations. Among these stars are β Orionis, 1 Herculis, δ Scuti, 111 Herculis. Professor Meyer has also determined the orbit of the spectroscopic binary 112 Herculis.

Professor Shane, in conjunction with Dr. Moore, has secured some preliminary observations at the Lick Observatory for the purpose of measuring the amounts of energy absorbed by different lines in the solar spectrum. He has also continued work on the spectra of stars belonging to classes N and R. One section of the investigation is nearly ready for publication. He has measured and reduced a large number of plates for wave lengths of lines in the ultra-violet spectra of the stars of classes O8-A6 which he hopes to publish during the current year. He has also photographed the total lunar eclipse of June 15 in light of different colors as described in the *Publications of the Astronomical Society of the Pacific* for August, 1927.

The exchange system between the Lick and Berkeley Astronomical Departments has made it possible for the members of our staff to devote part of their time to investigations under the most favorable circumstances. Unfortunately, owing to pressure of work, Astronomer W. H. Wright of the Lick Observatory was unable to carry out his contemplated exchange with a member of the Berkeley Astronomical Department.

Mr. H. B. Kaster, Assistant in the Department, has designed an instrument by means of which the hour angle, latitude, or geographical coördinates of points on the Sumner line may be observed directly by the navigator at sea. A description of the instrument is given in the *Publications of the Astronomical Society of the Pacific,* Vol. XXXIX, No. 231, October, 1927. A working model of this instrument is now being constructed by the University.

A study of the motion of the Pons-Winnecke comet has been made by Professor Leuschner with the assistance of Dr. Thiele and several graduate students. This is published in the *Publications of the Astronomical Society of the Pacific,* Vol. XXXIX, No. 231, October, 1927. It is interesting to note that in 1918 the comet's mean motion was exactly commensurable to that of Jupiter.

The principal work of Professor Leuschner and Dr. Thiele during the past year, assisted by a number of graduate students, has been on the Research Surveys of the Minor Planets under a grant from the National Research Council. So far about 24,000 cards have been prepared containing classified information concerning the minor planets and 1200 large sheets containing elements. Practically the whole literature on the subject of minor planets from the beginning, about 1800 A.D., to the present time has been examined, comprising 2,159 volumes.

The preparation of the Research Surveys requires elimination from the cards and elements sheets of all material which has only temporary value. Each Survey will contain suggestions for further work on the minor planets. The manuscript of the Research Surveys of the oldest sixty planets, for which the literature is the most extensive, is ready for final revision. During the summer Professor C. H. Gingrich, Editor of *Popular Astronomy,* spent several months at Berkeley assisting in the collection of the data from the cards and elements sheets for a first draft of the Research Surveys. Many important preliminary results have already come out of this work and with its progress its value for the solution of larger problems in astronomy has become apparent. A comparison is constantly under way of different methods of attack in determining planetary motions and of the resulting predictions.

A. O. LEUSCHNER, *Director.*

CINCINNATI OBSERVATORY

CINCINNATI, OHIO

The scientific work of the observatory has been continued along the same lines as heretofore, namely, the observation of stars with pronounced proper motion. In addition, observations were made, at the request of Professor Kopff, of the Eros comparison stars between declinations 0° and —10°.

The Observatory has been open to visitors on twelve evenings in each month. Many schools avail themselves of the privilege of bringing classes to the Observatory.

Owing to the increased demand for instruction in our growing University, less time than in former years is available for scientific work.

J. G. PORTER, *Director.*

OBSERVATORIO NACIONAL ARGENTINO

CÓRDOBA, ARGENTINA

(For the year ending December 31, 1926)

Observations. Owing to the continued interruption of reconstruction of the main administrative building, the only observations attempted have been time determinations; a few observations needed to complete the polar zone catalog; the DM observations to complete the last zone, —62° to —82°, with the small 5-inch refractor placed temporarily in the dome of the 12-inch; and a few urgent plates with the Astrograph.

With the meridian circle, 886 observations were made for the polar catalog; with the Durchmusterung equatorial 125 mm, 10,145 observations were made in the last zone of the DM, —62° to —82°; and with

the Astrographic telescope, 65 plates were obtained in the zone —24° to —31° for comparison with the earlier series for the detection of large proper motions, and 36 plates of other subjects were obtained for various purposes, chiefly prismatic spectra.

Fundamental Catalog. The reduction and discussion of observations are practically complete for the right ascensions and so far along for the declinations that it is hoped to have the catalog ready for printing this year (1927). The agreement of the individual observations is highly satisfactory, the actual probable error not being over $0^s.010$. As a final and general test, the determinations of azimuths from the time stars agree with those derived from the circumpolars within their probable error.

Astrographic Catalog. Zones —25°, —26°, and the half of —27° were printed. Zones —21° and —25° were distributed. Zone —26° was received at the end of the year and will be distributed at once.

The computations of the —28° zone were completed and part of the manuscript prepared for the printer. The computations for —29° were nearly completed.

Astrographic Charts. The charts for —25° were sent out by M. Schutzenberger.

Durchmusterung Maps. Five of the nine maps of the zone —42° to —62° are completed. The remaining four will be completed in 1927. The map for the polar zone, —81° to —90°, was also completed.

Beyond the preparation of the detailed plans for the dome of the 60-inch reflector and those of the mechanic's house and shops and the battery house, little was done on that instrument. Funds for its completion are included in the budget for 1927. Bids for the completion of the new administration building were opened in September, and it is expected that work will be begun early in 1927.

C. D. Perrine, *Director.*

DEARBORN OBSERVATORY

Northwestern University

Evanston, Illinois

The year 1926-27, like the preceding year, has had a considerable excess of cloudy weather over the normal, resulting in lessened number of micrometric observations as well as few photographs on the parallax program. The plates numbered but 113. The stellar spectrograph has been given the major part of the observing time and 772 spectrograms have been secured by Fox, Paddock, and Elvey, the majority by the latter. These plates are principally of the brighter spectroscopic binaries among stars of the early type. Measurement of the spectrograms is proceeding.

The Director and Miss Bennot have continued their work on the

Dearborn Observatory parallaxes. The revised summary of the results was presented in a paper at the Madison meeting of the American Astronomical Society. The manuscript of the volume containing this work is nearly completed.

During the year Northwestern University has received a bequest from the estate of Mr. Walter M. Camp, late editor of the Railway Review. The income is to be expended for and by the Astronomical Department for planetary research. The income from this fund will be in the neighborhood of $1200 a year, plans for the utilization of which are being formulated.

Members of the staff have had the usual responsibility for teaching in the College and the Graduate School.

The usual interest has been manifested in the visitors' night at the Observatory.

PHILIP FOX, *Director.*

DOMINION OBSERVATORY

OTTAWA, CANADA

Meridian Work and Time Service. Observations on the regular meridian circle program were interrupted for several months in order to allow the staff and instruments to take part in the international longitude program. The meridian circle and an astronomical transit were employed for observing at Ottawa and two astronomical transits, one of the broken type, at Vancouver. Observations for personal equation were obtained on 17 nights and longitude observations on 35 nights at Ottawa and 25 nights at Vancouver. During the year 4178 observations of stars and 54 of the sun were made with the meridian circle.

The time service in the Government buildings was continued without material changes. Time signals are sent out daily except Sunday over the telegraph line at noon and by radio through station CNRO at 3 P.M. The time signals from Annapolis, Lafayette, and Nauen were observed as usual.

Solar Physics. About 100 photographs of the sun were made, recording sunspots with east-west and heliographic lines. Prints of these were supplied to the Government Radio Branch in connection with their study of possible effects of sunspots on radio. Some 635 nine-strip spectrograms were secured with the 7 m spectrograph, using the 23 cm image of the sun produced by the coelostat telescope. About 450 spectrograms were measured, and numerous computations made.

Measurements of the annual rings of a section of a pre-glacial spruce released in 1925 by the recession of the glacier in Tarr Inlet, Yukon, revealed the presence of the 11.5 year period. Investigation of the Hudson's Bay Company's fur records of the last 80 years has shown what appears to be the influence of the same periodicity.

Fifteen-inch Equatorial. Spectrograms to the number of 653 were secured, special attention being given to the bright Cepheids and to a few triple systems. A discussion of the radial velocity measures of ν Eridani has shown that the large variation of amplitude of the short-period velocity curve is probably periodic and may be due to tidal effects. A study was also made of η Aquilae, analyzing and comparing the radial velocities given by different lines. Considerable preliminary experimental work was done with the photo-electric photometer, and observations on a regular program have been begun.

Photographic Photometer. The program for the determination of magnitudes of comparison stars in Cepheid fields was continued with the 8-inch and 6-inch doublets. The Leavitt fields were used for standard magnitudes, from which the reduction curves were obtained, the exposure on the Leavitt field being made immediately before or after that on the Cepheid field. Three hundred plates were taken during the year and the plates of about twenty fields have been measured and reduced. Observational work was also carried on with the 2-inch cameras, the program calling for two months' work on each group of Cepheid fields. Three hundred and ten plates were taken but no reductions have as yet been made.

Seismology. Earthquakes to the number of 365 were registered, and these were reported in monthly bulletins to 222 stations. The seismographs were in practically continuous operation at Ottawa, Saskatoon, Halifax, and Ste. Anne de la Pocatiere. The last named station was discontinued about the middle of June, and will not be again in operation. The Wood-Anderson seismographs for two new stations in the province of Quebec were received and their installation is under way. The *Bibliographical Bulletin* of the Eastern Section of the Seismological Society of America was prepared and distributed quarterly.

Terrestrial Magnetism. During the year magnetic work was carried out in accordance with a program which was begun the year preceding and had for its object, mainly, the securing of secular change data over the region of the Dominion already covered by the systematic survey. The three magnetic elements, declination, inclination, and horizontal intensity were observed at forty-one stations representing thirty-nine localities, thirty-two being repeat stations. These are fairly uniformly distributed and are confined to the area lying between longitude 68°W and 98°W, and between the Canada-United States boundary and latitude 50°N.

Gravity. Gravity observations were made at eight stations along the Pacific coast. The computations of the results of all the field stations in western Canada, 69 in number, as well as the isostatic reductions for these stations, have been completed.

R. Meldrum Stewart, *Director.*

DOMINION ASTROPHYSICAL OBSERVATORY

VICTORIA, BRITISH COLUMBIA

Staff. No changes occurred in the permanent technical staff during the year ending June 30 which this report covers. During the summer vacations Mr. R. M. Petrie, Mr. W. H. Christie, and Mr. P. M. Millman, all university students, assisted in the observing and measuring for five, three, and two months respectively.

Observing. The weather for these twelve months was slightly below the average as indicated by our records. An eight-year average shows a yearly output of 1691 spectrograms on 206 nights, while for the year under consideration 1640 were secured on 199 nights. Of these nights 132 might be classed as good, when 1509 spectra were obtained and 67 as poor, when 131 were secured. A few plates, as in former years, were long-exposure spectra of nebulae or faint stars but apart from such the spectra secured were of stars on the regular programs of B- and A-type stars, using the medium and short focus cameras with one prism dispersion.

Programs and Results. On the special B-type program which has been under way for three years, it is estimated that two-thirds of the observations have been secured. The radial velocities for 275 stars have been completed with an average of 6 plates for each star. The average residual velocity for those completed comes out considerably higher than Campbell found some years ago for the brighter B-stars. Considerable progress has been made also in securing the spectra of the A-type stars and in both cases the measurement and reduction of these plates has kept fairly close pace with observation.

In carrying out these programs a number of spectroscopic binaries have been discovered and considerable time has been spent upon these. During the year 17 orbits were completed of which all but one have been published. In order of completion the stars are: H.R. 4750, Boss 5579, H.D. 19820, κ Draconis, H.R. 4535, Boss 3555, H.R. 8169, 71 Aquilae, 33 Piscium, H.D. 214240, H.D. 193536, Lal 4268, H.R. 839, Boss 809, β Scuti, 4 Urs. Min. and B.D. 66°678. The three B-type stars with H.D. numbers show both spectra as also is the case with the three A-type stars, Boss 5579, Boss 3555, H.R. 8169. The total minimum masses for these B-stars are 28.1, 9.9, and 5.3 times the sun, while for the A-stars the corresponding values are 4.2, 3.0, and 2.0 times the sun. The shortest period among these is that of κ Draconis with $P = 0.89$ days and the longest, β Scuti, $P = 834$ days. Besides these completed binaries a new series has been obtained of 12 Lacertae with observations of its light variations over the same interval. Considerable time has also been spent on the variations in the elements of the star Boss 3511, whose period is 1.6 days and whose amplitude variation is small.

A number of spectra of the bright line star Z Andromedae have been

secured and measured to determine the wave-lengths in its remarkable spectrum. Spectrophotometric studies of the nebulae and the hotter stars have also required some of the observing time and a discussion of existent observations on the galactic nebulae is in progress.

Visitors. As in previous years the telescope is placed at the disposal of visitors for two hours each Saturday evening and, needless to say, this privilege is one that is prized and taken advantage of. With an excellent road now to the observatory it is becoming an increasing mecca for tourists and last year considerably over 30,000 visited the place.

Publications. There were issued during the year Numbers 12 to 18 inclusive of Volume III, while Numbers 1 and 2 of Volume IV are almost through the press.

J. S. PLASKETT, *Director.*

[*To be continued.*]

PLANET NOTES FOR JANUARY.

By CLIFFORD E. SMITH.

The *Sun* during January will be moving northeast from the central part of Sagittarius to the central part of Capricornus. On January 4 the sun will be nearest the earth, or the earth will be at perihelion. The position of the sun on January 1 and January 31, respectively, will be: R.A. $18^h\,41^m$, Decl. $-23°\,7'$; R.A. $20^h\,49^m$, Decl. $-17°\,47'$.

The phases of the *Moon* will occur as follows:

Full Moon	Jan.	6 at	12 P.M.	C.S.T.
Last Quarter		14 "	3 P.M.	"
New Moon		22 "	2 P.M.	"
First Quarter		29 "	1 P.M.	"

The moon will be at perigee (nearest the earth) on January 3 and January 29, and at apogee (farthest from the earth) on January 15.

Mercury will be in Sagittarius about twenty minutes of time west of the sun at the beginning of the month. It will be at superior conjunction January 9. At the end of the month Mercury will be near the eastern border of Capricornus, and will set about an hour after the sun.

Venus will be a morning star during this period. Early in the month it will be near the western border of Scorpio and will rise about three hours before the sun. During the month it will cross Ophiuchus. At the end of the month it will be in the western part of Sagittarius and will rise about two and a half hours before the sun. On January 16 Venus will be in conjunction with Saturn. They will be separated by a distance of about the diameter of the moon.

Mars will be in the central part of Ophiuchus early in the month. Late in the month it will be in the central part of Sagittarius and will rise at this time about two hours before the sun.

Jupiter will be in Pisces. During the middle of the month it will set about four and a half hours after the sun. On January 23 Jupiter will be in conjunction

with Uranus. Jupiter will be at an angular distance from Uranus of about the diameter of the moon.

Saturn will be in the southern part of Ophiuchus. During the middle of the month it will rise about three hours before the sun. As has been mentioned in the notes about Venus, Saturn will be in conjunction with Venus on January 16.

Uranus will be in Pisces near Jupiter in the evening sky. As has been mentioned in the notes about Jupiter, Uranus will be in conjunction with Jupiter on January 23.

Neptune will be in Leo near Regulus (α Leonis). It will be visible most of the night hours since opposition will occur in February.

Occultations Visible at Washington.

[From the *American Ephemeris.*]

Date 1928	Star's Name	Magnitude	IMMERSION. Washington C.T.	IMMERSION. Angle from N	EMERSION. Washington C.T.	EMERSION. Angle from N	Duration
			h m	°	h m	°	h m
Jan. 6	5 Geminorum	5 9	1 21	69	2 29	294	1 8
6	ω Geminorum	5.2	19 1	135	19 39	210	0 38
7	35 B. Cancri	6.4	23 52	106	1 16	276	1 24
15	598 B. Virginis	6.1	0 36	196	0 48	218	0 12
15	623 B. Virginis	6.5	6 50	114	8 17	315	1 27
25	290 B. Aquarii	6.3	19 9	42	20 6	259	0 57
27	26 Ceti	6.0	22 5	114	22 41	196	0 36
29	38 Arietis	5.2	19 35	75	20 49	229	1 14

VARIABLE STARS.

Maxima of Variable Stars of Short Period.

[Calculated by members of the classes in Astronomy at Carleton College.]

Given to the nearest hour in Greenwich civil time; to obtain Eastern Standard time subtract 5^h; Central Standard time 6^h, etc.

Star	R.A. 1900	Decl. 1900	Magnitude	Approx. Period	Greenwich civil times of Maxima in 1928 January							
	h m	° ′		d h	d	h	d	h	d	h	d	h
SX Cassiop.	0 05.5	+54 20	8.6— 9.2	36 13.7			14	18				
SY Cassiop.	0 09.8	+57 52	9.3— 9.9	4 01.7	2	0	10	4	18	7	26	11
RR Ceti	1 27.0	+ 0 50	8.3— 9.0	0 13.3	5	11	11	0	22	2	27	14
RW Cassiop.	1 30.7	+57 15	8.9—11.0	14 19.2	1	10	16	5			31	0
V Arietis	2 09.6	+11 46	8.3— 9.0	0 23.8	6	17	13	15	20	14	27	13
SU Cassiop.	2 43.0	+68 28	6.5— 7.0	1 22.8	6	11	14	6	22	2	29	21
RW Camelop.	3 46.2	+58 21	8.2— 9.4	16 00.0	8	5			25	14		
SX Persei	4 10.2	+41 27	10.4—11.2	4 07.0	4	15	13	5	21	18	30	8
SV Persei	42.8	+42 07	8.8— 9.6	11 03.1	8	1			19	4	30	7
RX Aurigæ	4 54.5	+39 49	7.2— 8.1	11 15.0			10	23			22	14
SX Aurigæ	5 04.6	+42 02	8.0— 8.7	1 12.8	6	14	12	17	24	23	31	2
SY Aurigæ	05.5	+42 41	8.4— 9.5	10 03.3	8	10	18	13			28	16
Y Aurigæ	21.5	+42 21	8.6— 9.6	3 20.6	5	3	12	21	20	14	28	7
RZ Gemin.	5 56.6	+22 15	9.1—10.0	5 12.7	1	17	12	19	18	7	29	9
RS Orionis	6 16.5	+14 44	8.2— 8.9	7 13.6	4	2	11	15	19	5	26	18
T Monoc.	19.8	+ 7 08	5.7— 6.8	27 00.3							23	11
RT Aurigæ	23.0	+30 33	5.1— 6.0	3 17.5	3	13	11	0	18	11	25	21
W Gemin.	29.2	+15 24	6.7— 7.5	7 22.0	4	8	12	6	20	4	28	2
ζ Gemin.	6 58.2	+20 43	3.7— 4.3	10 03.7	4	16	14	20			25	0

Maxima of Variable Stars of Short Period—Continued.

Star	R.A. 1900		Decl. 1900		Magnitude	Approx. Period		Greenwich civil times of Maxima in 1928 January							
	h	m	°	′		d	h	d	h	d	h	d	h	d	h
RU Camelop.	7	10.9	+69	51	8.5— 9.8	22	06.5					17	8		
RR Gemin.	7	15.2	+31	04	10.0—11.5	0	09.5	5	11	11	10	21	8	29	7
V Carinæ	8	26.7	—59	47	7.4— 8.1	6	16.7	4	17	11	9	24	19	31	12
T Velorum	8	34.4	—47	01	7.6— 8.5	4	15.3	2	2	11	9	20	15	29	22
V Velorum	9	19.2	—55	32	7.5— 8.2	4	08.9	4	1	12	19	21	13	30	7
Z Leonis	9	46.4	+27	22	7.9— 9.6	56	08.7					20	22		
RR Leonis	10	02.1	+24	29	9.1—10.1	0	10.9	3	8	12	9	21	11	30	12
SU Draconis	11	32.2	+67	53	8.9— 9.6	0	15.8	6	22	13	12	20	3	26	17
S Muscæ	12	07.4	—69	36	6.4— 7.3	9	15.8	0	19	10	11	20	2	29	18
SW Draconis		12.8	+70	04	8.8— 9.6	0	13.7	1	16	13	1	18	18	30	3
T Crucis		15.9	—61	44	6.8— 7.6	6	17.6	2	7	9	1	22	12	29	5
R Crucis		18.1	—61	04	6.8— 7.9	5	19.8	4	12	10	8	21	23	27	19
S Crucis	12	48.4	—57	53	6.5— 7.6	4	16.6	5	9	14	18	19	11	28	20
W Virginis	13	20.9	—	2 52	8.7—10.4	17	06.5	1	13			18	20		
SS Hydræ		25.0	—23	08	7.4— 8.1	8	04.8	5	7	13	12	21	17	29	22
RV Urs. Maj.	13	29.4	+54	31	9.2— 9.9	0	11.2	9	13			18	22	28	6
ST Virginis	14	22.5	—	0 27	10.3—11.4	0	09.9	8	14	16	19			25	0
V Centauri		25.4	—56	27	6.4— 7.8	5	11.9	4	6	15	5	20	17	31	17
RS Bootis		29.3	+32	11	8.9—10.0	0	09.1	7	19	15	8	22	21	30	10
R Trian.Austr.	15	10.8	—66	08	6.7— 7.4	3	09.3	1	10	11	14	21	18	28	13
S Trian.Austr.	15	52.2	—63	29	6.4— 7.4	6	07.8	2	9	8	16	21	8	27	16
S Normæ	16	10.6	—57	39	6.6— 7.6	9	18.1	4	14	14	8			24	2
RW Draconis		33.7	+58	03	9.6—10.8	0	10.6	1	8	7	23	21	6	27	22
RV Scorpii	16	51.8	—33	27	6.7— 7.4	6	01.5	1	10	13	13	19	14	31	17
X Sagittarii	17	41.3	—27	48	4.4— 5.0	7	00.3	4	20	11	20	18	21	25	21
Y Ophiuchi		47.3	—	6 07	6.1— 6.5	17	02.9	4	11			21	14		
W Sagittarii	17	58.6	—29	35	4.3— 5.1	7	14.3	8	1	15	15	23	5	30	19
Y Sagittarii	18	15.5	—18	54	5.4— 6.2	5	18.6	3	18	9	12	21	1	26	20
U Sagittarii		26.0	—19	12	6.5— 7.3	6	17.9	2	10	9	4	22	15	29	9
Y Scuti		32.6	—	8 27	8.7— 9.2	10	08.3	1	5	11	14	21	22		
RZ Lyræ		39.9	+32	42	9.9—11.2	0	12.3	7	21	15	13	23	5	30	21
RT Scuti		44.1	—10	30	9.1— 9.7	0	11.9	7	19	15	5	22	16	30	2
κ Pavonis	18	46.6	—67	22	3.8— 5.2	9	02.2	2	6	11	9	20	11	29	13
U Aquilæ	19	24.0	—	7 15	6.2— 6.9	7	00.6	5	2	12	2	19	3	26	4
XZ Cygni	19	30.4	+56	10	8.6— 9.3	0	11.2	0	5	7	5	14	5	28	5
U Vulpec.		32.2	+20	07	6.5— 7.6	7	23.5	4	21	12	20	20	21	28	20
SU Cygni		40.8	+29	01	6.2— 7.0	3	20.3	5	10	13	2	20	19	28	11
η Aquilæ		47.4	+	0 45	3.7— 4.5	7	04.2	2	5	9	9	23	17	30	21
S Sagittæ		51.5	+16	22	5.6— 6.4	8	09.2	6	17	15	2	23	11		
X Vulpec.	19	53.3	+26	17	9.5—10.5	6	07.7	3	13	9	21	22	12	28	20
X Cygni	20	39.5	+35	14	6.0— 7.0	16	09.3	2	13			18	22		
T Vulpec.		47.2	+27	52	5.5— 6.1	4	10.5	3	16	12	13	21	10	30	7
UY Cygni		52.3	+30	03	9.6—10.4	0	13.5	5	20	11	11	22	16	28	6
RV Capric.		55.9	—15	37	9.2—10.1	0	10.7	4	16	13	15	22	14	31	13
TX Cygni	20	56.4	+42	12	8.5— 9.7	14	17.4	1	17	16	10			31	3
VY Cygni	21	00.4	+39	34	8.8— 9.5	7	20.6	3	1	10	22	18	18	26	15
SW Aquarii		10.2	—	0 20	9.9—10.8	0	11.0	4	20	14	0	18	15	27	19
VZ Cygni	21	47.7	+42	40	8.2— 9.2	4	20.7	2	6	11	23	21	17	31	10
Y Lacertæ	22	05.2	+50	33	9.1— 9.6	4	07.8	4	14	13	6	21	21	30	13
δ Cephei		25.5	+57	54	3.7— 4.6	5	08.8	5	5	11	14	22	7	27	16
Z Lacertæ		36.9	+56	18	8.2— 9.0	10	21.1	4	2	15	0			25	21
RR Lacertæ		37.5	+55	55	8.5— 9.2	6	10.1	4	12	10	22	23	17	30	3
V Lacertæ		44.5	+55	48	8.5— 9.5	4	23.6	2	15	12	14	17	14	27	13
X Lacertæ	22	45.0	+55	54	8.2— 8.6	5	10.7	3	8	14	6	19	16	30	13
SW Cassiop.	23	03.7	+58	11	9.2— 9.7	5	10.6	5	15	11	1	21	23	27	9
RS Cassiop.		32.6	+61	52	9.0—11.0	6	07.1	6	4	12	11	25	2	31	9
RY Cassiop.		47.2	+58	11	9.3—11.8	12	03.4	9	8			21	11		

Minima of Variable Stars of Short Period.

[Calculated by members of the classes in Astronomy at Carleton College.]

Given to the nearest hour in Greenwich civil time; to obtain Eastern Standard time subtract 5^h; Central Standard time 6^h, etc.

Star	R.A. 1900	Decl. 1900	Magnitude	Approx. Period	Greenwich civil times of Minima in 1928 January							
	h m	° ′		d h	d h		d h		d h		d h	
SY Androm.	0 08.0	+43 09	9.5—13.0	34 21.8	8 20							
RT Sculptor.	31.5	−26 13	9.6—10.5	0 12.3	7 7		14 11		21 15		28 19	
U Cephei	0 53.4	+81 20	7.0— 9.0	2 11.8	8 5		15 16		23 4		30 15	
Z Persei	2 33.7	+41 46	9.4—12	3 01.4	6 20		13 23		25 4		31 7	
TW Cassiop.	37.6	+65 19	8.2— 9.0	1 10.3	1 12		12 22		18 15		30 1	
RY Persei	39.0	+47 43	8.0—10.3	6 20.7	6 9		13 5		20 2		26 23	
RZ Cassiop.	39.9	+69 13	6.9— 8.1	1 04.7	3 9		12 22		17 17		27 6	
ST Persei	53.7	+38 47	8.5—10.5	2 15.6	0 18		8 17		16 16		24 14	
RX Cassiop.	2 58.8	+67 11	8.6— 9.1	32 07.6					21 7			
Algol	3 01.7	+40 34	2.3— 3.5	2 20.8	0 18		9 8		17 23		26 13	
RT Persei	16.7	+46 12	9.5—11.5	0 20.4	6 2		12 1		17 23		23 22	
λ Tauri	55.1	+12 12	3.3— 4.2	3 22.9	0 21		8 19		16 17		24 14	
RW Tauri	3 57.8	+27 51	7.1— [11	2 18.5	2 1		10 8		18 15		26 23	
RV Persei	4 04.2	+33 59	9.5—11.0	1 23.4	1 3		12 23		18 22		30 18	
RW Persei	13.3	+42 04	8.8—11.0	13 04.8			12 14				25 18	
SZ Tauri	31.4	+18 20	7.2— 7.7	3 03.6	1 2		7 10		20 0		26 7	
RS Cephei	4 48.6	+80 06	9.5—12.0	12 10.1	5 12		17 22				30 8	
TT Aurigae	5 02.8	+39 27	7.8— 8.7	0 16.0	2 14		13 15		19 4		30 5	
RY Aurigae	11.5	+38 13	10.7—11.7	2 17.5	8 14		14 1		24 22		30 9	
RZ Aurigae	42.9	+31 40	10.6—13.3	3 00.3	5 6		11 6		23 7		29 8	
SV Tauri	45.8	+28 05	9.4—11.0	2 04.0	1 10		7 22		20 22		27 10	
Z Orionis	50.2	+13 40	9.7—10.7	5 04.9	2 12		12 22		18 3		28 12	
SV Gemin.	54.6	+24 28	9.8— [11	4 00.2	2 22		10 22		18 22		26 22	
RW Gemin.	5 55.4	+23 08	9.5—11.0	2 20.8	6 0		11 18		17 11		23 5	
U Columbæ	6 11.2	−33 03	9.2—10.0	2 19.2	6 7		12 13		25 0		31 6	
SX Gemin.	22.0	+20 37	10.8—11.5	1 08.8	1 4		8 0		21 16		28 12	
RW Monoc.	29.3	+ 8 54	9.0—10.8	1 21.7	8 2		15 17		23 8		30 23	
RX Gemin.	43.6	+33 21	8.8— 9.6	12 05.0	0 21		13 2		25 7			
RU Monoc.	6 49.4	− 7 28	9.8—10.5	0 21.5	0 16		7 20		22 4		29 8	
R Can. Maj.	7 14.9	−16 12	5.8— 6.4	1 03.3	1 0		7 19		21 11		28 6	
RY Gemin.	21.7	+15 52	8.9— [10	9 07.2	5 22		15 5		24 12			
Y Camelop.	27.6	+76 17	9.5—12	3 07.3	2 11		9 1		22 7		28 21	
TX Gemin.	30.3	+17 08	10.0—11.9	2 19.2	1 11		9 20		18 6		26 16	
RR Puppis	43.5	−41 08	9.4—10.7	6 10.3	6 6		12 16		25 12		31 23	
V Puppis	7 55.4	−48 58	4.1— 4.8	1 10.9	8 0		15 6		22 12		29 19	
X Carinæ	8 29.1	−58 53	7.9— 8.7	0 13.0	1 4		8 5		22 6		29 7	
S Cancri	8 38.2	+19 24	8.2—10	9 11.6	7 5		16 16				26 4	
RX Hydræ	9 00.8	− 7 52	9.1—10.5	2 06.8	4 6		13 9		22 12		31 15	
S Velorum	29.4	−44 46	7.8— 9.3	5 22.4	5 4		11 2		22 23		28 21	
Y Leonis	9 31.1	+26 41	9.3—11.2	1 16.5	7 21		13 15		20 9		27 2	
RR Velorum	10 17.8	−41 36	10.0—10.9	1 20.5	7 15		15 1		22 11		29 21	
SS Carinæ	10 54.2	−61 23	12.2—12.8	3 07.2	2 4		8 19		22 0		28 14	
RW Urs. Maj.	35.4	+52 34	10.3—11.4	7 07.9	7 12		14 20		22 4		29 12	
Z Draconis	11 39.8	+72 49	9.9—13.6	1 08.6	7 14		14 9		21 4		27 23	
RZ Centauri	12 55.6	−64 05	8.5— 8.9	1 21.0	7 18		15 6		22 18		30 6	
RS Can. Ven.	13 06.3	+36 28	7.5—12.5	4 19.1	3 13		13 4		17 23		27 13	
SS Centauri	13 07.2	−63 37	8.8—10.4	2 11.5	1 9		8 20		23 17		31 3	
SX Hydræ	39.0	−26 23	8.6—12.7	2 21.5	1 14		13 4		18 23		30 13	
δ Libræ	14 55.6	− 8 07	4.8— 6.2	2 07.9	1 17		8 16		22 15		29 15	
U Coronæ	15 14.1	+32 01	7.6— 8.7	3 10.9	1 19		8 17		22 12		29 10	

Minima of Variable Stars of Short Period—Continued.

Star	R.A. 1900	Decl. 1900	Magnitude	Approx. Period	Greenwich civil times of Minima in 1928 January							
	h m	° ′		d h	d h	d h	d h	d h	d h	d h	d h	d h
TW Draconis	15 32.4	+64 14	7.3— 8.9	2 19.4			9 10		17 20		26 8	
SS Libræ	15 43.4	—15 14	9.3—11.5	0 18.4	1 7		8 12		22 21		30 2	
SW Ophiuchi	16 11.1	— 6 44	9.2—10.0	2 10.7	1 9		8 17		23 9		30 17	
SX Ophiuchi	12.6	— 6 25	10.5—11.2	2 01.5	1 22		8 3		20 12		26 16	
R Aræ	31.1	—56 48	6.8— 7.9	4 10.2	1 19		10 15		19 11		28 8	
TT Herculis	16 49.9	+17 00	8.9— 9.3	20 18.1	5 21				26 15			
TU Herculis	17 09.8	+30 50	9.5—12	2 06.4	2 0		8 19		22 9		29 4	
U Ophiuchi	11.5	+ 1 19	6.0— 6.7	1 16.2	7 5		13 22		20 15		27 6	
μ Herculis	13.6	+33 12	4.6— 5.4	2 01.2	1 15		7 16		20 1		26 5	
TX Herculis	15.4	+42 00	8.3— 9.0	2 01.4	6 8		12 13		24 21		31 1	
RV Ophiuchi	29.8	+ 7 19	9. —12	3 16.5	1 20		9 5		23 23		31 8	
SZ Herculis	36.0	+33 01	9.5—10.3	0 19.6	4 23		9 20		19 16		24 14	
TX Scorpii	48.6	—34 13	7.5— 8.2	0 22.6	7 9		14 0		20 14		27 4	
UX Herculis	49.7	+16 57	8.8—10.5	1 13.2	0 20		11 17		22 13			
Z Herculis	53.6	+15 09	7.1— 7.9	3 23.8	2 22		10 22		18 21		26 21	
WX Sagittarii	53.6	—17 24	9.2—10.8	2 03.1	1 7		7 17		20 11		26 20	
WY Sagittarii	17 54.9	—23 01	9.5—10.6	4 16.0	4 9		13 17		18 9		27 17	
SX Draconis	18 03.0	+58 23	9.3—10.5	5 04.1	2 22		13 6		18 10		28 18	
RS Sagittarii	11.0	—34 08	5.9— 6.3	2 10.0	8 2		15 8		22 14		29 20	
V Serpentis	11.1	—15 34	9.5—11.1	3 10.9	1 2		8 0		21 19		28 17	
RZ Scuti	21.1	— 9 15	7.4— 8.3	15 03.2	0 8		15 12				30 17	
RZ Draconis	21.8	+58 50	9.5—10.2	0 13.2	7 20		15 13		23 6		30 23	
RX Herculis	26.0	+12 32	7.0— 7.6	0 21.3	0 12		9 9		18 7		27 4	
SX Sagittarii	39.7	—30 36	8.7— 9.8	2 01.8	1 12		9 20		18 3		26 10	
RR Draconis	40.8	+62 34	9.3—13	2 19.9	2 17		11 5		19 16		27 4	
RS Scuti	43.7	—10 21	9.3—10.3	0 15.9	0 16		8 16		16 15		24 15	
β Lyræ	46.4	+33 15	3.4— 4.1	12 21.8	0 2		13 0				25 22	
U Scuti	18 48.9	—12 44	9.1— 9.6	0 22.9	0 7		7 22		23 5		30 21	
RX Draconis	19 01.1	+58 35	9.3—10.2	1 21.4	7 14		15 4		22 18		30 8	
RV Lyræ	12.5	+32 15	11. —12.8	3 14.4	7 17		14 21		22 2		29 7	
RS Vulpec.	13.4	+22 16	6.9— 8.0	4 11.4	4 11		13 10		22 9		31 8	
U Sagittæ	14.4	+19 26	6.5— 9.0	3 09.1	1 19		8 13		22 2		28 20	
Z Vulpec.	17.5	+25 23	7.3— 8.5	2 10.9	1 23		9 7		24 1		31 9	
TT Lyræ	24.3	+41 30	9.4—11.6	5 05.8	4 1		14 12		19 18		30 5	
UZ Draconis	26.1	+68 44	9.0— 9.8	1 15.1	1 6		8 10		16 14		24 17	
SY Cygni	19 42.7	+32 28	10. —12	6 00.2	5 2		11 2		23 2		29 2	
WW Cygni	20 00.6	+41 18	9.3—13.4	3 07.6	0 4		10 3		20 2		30 1	
SW Cygni	03.8	+46 01	9. —11.7	4 13.8	4 4		13 8		22 11		31 15	
VW Cygni	11.4	+34 12	9.8—11.8	8 10.3	5 12		13 23		22 9		30 19	
RW Capric.	12.2	—17 59	8.8—10.6	3 09.4	2 12		9 7		22 21		29 16	
UW Cygni	19.6	+42 55	10.5—13	3 10.8	1 8		7 6		21 1		27 23	
V Vulpec.	32.3	+26 15	8.2— 9.8	37 19.0					18 17			
W Delphini	33.1	+17 56	9.4—12.1	4 19.4	2 15		12 9		21 20		31 11	
RR Delphini	38.9	+13 35	10.5—11.8	4 14.4	2 19		11 24		21 3		30 21	
Y Cygni	48.1	+34 17	7.1— 7.9	2 23.9	1 12		7 12		19 11		25 11	
WZ Cygni	49.3	+38 27	9.9—10.8	0 14.0	7 12		14 16		21 19		28 22	
RR Vulpec.	20 50.5	+27 32	9.6—11.0	5 01.2	1 15		11 17		21 20		31 22	
RY Aquarii	21 14.8	—11 14	8.8—10.4	1 23.2	1 8		13 4		19 1		30 20	
UZ Cygni	55.2	+43 52	8.9—11.6	31 07.3			15 4					
RT Lacertæ	21 57.4	+43 24	9.1—10.5	5 01.7	1 13		11 16		16 18		26 22	
RW Lacertæ	22 40.6	+49 08	10.2—11.2	5 04.4	2 4		12 13		17 17		28 2	
VW Pegasi	51.7	+32 42	10.0—10.6	5 06.4	5 20		11 3		21 16		26 23	
Y Piscium	23 29.3	+ 7 22	9.0—12.0	3 18.4	5 4		12 16		20 5		27 18	
TW Androm.	23 58.2	+32 17	8.6—11.5	4 02.9	4 9		12 15		20 21		29 3	

Monthly Report of the American Association of Variable Star Observers, for the Month of October, 1927.

The meeting of the Association held at Harvard on October 22 was a record breaker in many respects. Council members began to gather on October 20, and some members remained over until October 23. The Council discussed matters quite completely, especially the financial end of affairs. A Finance Committee was duly appointed to study the subject and present a report for consideration at a later date. New members were elected as follows:

C. D. Swanson, Montclair, N. J.
C. R. Gregory, Auburn, N. Y.
J. A. Blatchford, S.J., Weston, Mass.
A. D. Hole, Richmond, Ind.
John Soberanes, San Jose, Calif.
David Rittenberg, New York, N. Y.
John Cummings, New Haven, Conn.
Frances Eger, New Haven, Conn.

Vice President Alice H. Farnsworth presided during the morning session and a part of the afternoon session, with credit to herself and to the Association. The reports of Officers and Committees indicated, in a very decided fashion, the flourishing condition of the Association. The acquisition of the Charles C. Godfrey Memorial equipment was of particular interest, and already one of the large reflectors is en route to Texas to be used by Mr. Logan who has made splendid progress in variable star observing during the past year. Mr. Logan was present at the meeting and probably holds the record for distance, especially from the South. The report of the Committee on Occultations pointed out very vividly the great value of this work, both from the observational and reductional point of view.

Several papers were presented, including:

Discovery of Variables with the Blink Machine.....W. J. Luyten
Variable Star Notes for 1927 .....Leon Campbell
Occultations .....E. W. Brown
A Meteor Astrolabe .....W. J. Fisher
Comparison of Visual and Photographic Light Curves of
Long Period Variables .....W. F. H. Waterfield

The features of the afternoon session were the Solar Eclipse Symposium, in which Professors Stetson and Luyten played the major parts, and the lectures on "Waves of Sound and Light" so ably presented by Professor F. A. Saunders at the Jefferson Physical Laboratory of Harvard University. The lecture was fully illustrated with experiments on special apparatus.

The annual dinner at the Hotel Bellevue was in the nature of a Memorial to the late president, Dr. Charles C. Godfrey. Mr. Waldo, a near neighbor to Dr. Godfrey, and a very intimate friend, in talking on the subject, "The Story of a Life," portrayed in clear and concise words the manifold activities of Dr. Godfrey, giving the members many side-lights on the life of a really great man, many of which were totally unknown to the majority of those assembled. Dr. Shapley followed by reviewing in his inimitable manner the progress of astronomy during the past year, under the title, "The Story of a Year." Secretary Olcott,

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1927.

Aug. 0 = J.D. 2425093; Sept. 0 = J.D. 2425124; Oct. 0 = J.D. 2425154.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
V SCL	W SCL	RU AND	o CET	W PER	X CAM
000339	*002833*	013238	*021403*	024356	043274
120[14.0 Bl	120 13.0 Bl	145 11.7 Pt	168 4.1 Sp	170 9.3 Hu	147 11.0 Gb
S SCL	Y CEP	Y AND	169 4.3 Sp	R HOR	149 11.8 Pt
001032	003179	013338	169 4.2 Ca	*025050*	155 12.2 Eb
111 10.0 Ht	170 10.0 Hu	145 12.6 Pt	169 4.6 Eb	111 12.8 Ht	155 12.4 Kz
111 10.0 En	U CAS	X CAS	169 3.5 Rw	120 12.6 Bl	V TAU
114 9.6 En	004047	014958	169 5.0 Kz	122 12.5 Bl	044617
116 9.9 Bl	145 13.3 Pt	145 13.1 Pt	170 5.0 Jo	X CET	149 13.5 Pt
120 9.8 Ht	167[12.2 Cl	153 12.7 Bn	S PER	*031401*	155[12.4 Kz
122 9.4 Bl	RW AND	RR ARI	021558	134 12.0 L	R LEP
122 9.5 En	004132	015023	125 10.3 Kl	145 12.1 Ca	*045514*
147 8.1 Pt	123[11.0 Ch	133 5.5 Go	125 10.4 Ch	147 11.8 Pt	126 7.1 L
X AND	145 13.0 Pt	145 5.5 Go	127 10.3 Kl	152 12.2 L	145 7.6 Ca
001046	V AND	155 5.6 Go	137 10.2 Kl	Y PER	148 7.1 Jo
169 11.0 Hu	004435	U PER	142 10.4 Kl	032043	149 7.2 Pt
T CET	169 11.0 Hu	015254	147 10.3 Kl	147 9.7 Gb	159 7.2 Rt
001620	X SCL	140 9.1 Ch	147 9.3 Pt	147 9.3 Pt	V ORI
134 5.6 L	*004435*	145 9.0 Pt	154 10.0 Kl	155 9.9 Kz	050003
T AND	120[13.6 Bl	154 9.7 Ca	R CET	155 10.1 Eb	149 12.5 Pt
001726	RV CAS	170 10.0 Hu	*022000*	R PER	T LEP
145 13.5 Pt	*004746a*	XX PER	148 11.1 Kz	032335	*050022*
155[12.6 Kz	145 12.7 Pt	015654	148 11.3 Eb	145 10.0 Ca	149 11.3 Pt
170 12.0 Ie	— CAS	140 8.2 Ch	169 9.7 Ca	147 9.9 Pt	R AUR
T CAS	004746b	R ARI	RR PER	154 9.4 Ca	050953
001755	145 10.6 Pt	021024	022150	155 9.2 Kz	148 9.2 Jo
114 10.1 Sg	W CAS	123 12.3 Ch	125 11.0 Ch	155 9.6 Eb	148 8.7 Ca
126 10.6 L	004958	147 12.8 Pt	147 11.2 Pt	169 8.8 Eb	149 9.3 Pt
139 10.8 L	145 8.3 Pt	169 12.0 Ca	U CET	169 8.9 Kz	155 9.6 Eb
142 11.2 Ch	148 8.5 Jo	W AND	*022813*	169 9.0 Ca	155 9.3 Kz
145 11.4 Pt	159 8.5 Jo	021143a	147 12.9 Pt	R TAU	S AUR
148 11.0 Jo	170 8.3 Hu	147 12.3 Pt	RR CEP	042209	052034
155 11.8 Kz	U TUC	T PER	022980	147 12.2 Pt	149 8.4 Pt
155 11.8 Eb	*005475*	021258	147 11.9 Pt	154 11.9 Ca	155 9.4 Eb
R AND	099 9.2 Sm	125 8.9 Ch	152 13.9 L	W TAU	155 9.2 Kz
001838	109 8.9 En	147 8.6 Pt	R TRI	042215	W AUR
119 8.1 Ch	112 8.7 Sm	Z CEP	023133	147 9.8 Pt	052036
143 8.2 Ch	113 8.6 En	021281	118 9.8 Ch	148 10.4 Eb	134 11.3 L
145 8.0 Pt	120 8.4 En	124 12.2 Ch	140 9.2 Ch	148 9.6 Jo	149 11.8 Pt
149 8.0 Jo	120 8.6 Bl	147 10.8 Pt	147 8.2 Pt	148 10.2 Kz	155 11.8 Eb
155 8.3 Jo	120 8.7 Sm	o CET	148 8.2 Jo	159 10.3 Rt	155 11.9 Kz
169 8.8 Eb	Z CET	*021403*	148 8.8 Kz	159 9.5 Jo	S ORI
169 9.0 Kz	*010102*	118 5.2 Ch	148 9.2 Eb	170 10.0 Jo	*052404*
170 8.0 Hu	145 12.7 Pt	124 4.9 Ch	159 7.5 Jo	S TAU	145[12.1 Ca
170 8.6 Jo	U SCL	126 4.4 L	169 6.9 Eb	042309	149 13.0 Pt
S TUC	*010630*	134 4.0 L	169 6.5 Kz	145[12.5 Ca	T ORI
001862	120 11.7 Bl	143 4.3 Ch	170 8.0 Hu	T CAM	*053005a*
099 10.5 Sm	UZ AND	145 4.2 Ca	170 6.6 Jo	043065	126 10.8 L
112 11.7 Sm	011041	147 4.5 Pt	W PER	126 8.4 L	134 10.1 L
120 12.3 Bl	155[13.1 Kz	148 4.2 Ca	024356	139 8.9 L	147 10.6 Pt
S CET	S CAS	148 5.2 Kz	125 10.6 Ch	139 8.7 Be	149 10.5 Pt
001909	011272	148 5.2 Eb	145 10.4 Ca	147 9.5 Pt	151 10.4 L
122 11.8 Ch	148 13.6 Pt	148 4.0 Jo	147 9.4 Pt	155 9.6 Eb	152 10.9 L
145[11.5 Ca	R PSC	151 4.0 L	148 10.0 Jo	155 9.4 Kz	155 11.2 Kz
T PHE	012502	153 4.0 Sp	148 9.6 Cl	RX TAU	155 10.8 Pt
002546	155 11.6 Kz	154 4.2 Ca	155 9.4 Kz	043208	155 11.2 Eb
120 13.3 Bl	155 11.5 Eb	156 4.0 Sp	155 10.0 Eb	155[11.9 Kz	157 11.0 Pt
		158 4.2 Ca	169 9.6 Eb		162 10.5 Pt
		159 4.4 Jo	169 9.2 Kz		

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1927.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
S CAM	Z AUR	R VOL	R CAR	V HYA	T UMA
053068	055353	*070772*	*092962*	*104620*	123160
149 9.5 Pt	148 9.9 Eb	097 10.1 Ht	095 5.8 En	107 8.2 Bl	158 9.1 Ca
155 10.0 Eb	149 9.5 Pt	V GEM	096 6.1 Sm	122 8.5 Bl	RS UMA
155 9.9 Kz	155 9.8 Pt	071713	097 6.3 Ht	RS HYA	123459
RU AUR	157 10.2 Pt	155 12.0 Pt	107 6.5 Bl	*104628*	139 13.1 Pt
053337	159 9.9 Pt	S CMI	108 6.0 En	107 12.3 Bl	148[13.4 Cb
149[12.4 Pt	162 10.2 Pt	072708	111 6.8 Sm	RS CAR	S UMA
U AUR	164 10.2 Pt	148 9.7 Jo	111 6.6 Ht	*110361*	123961
053531	168 10.2 Pt	154 9.4 Ca	116 6.9 Bl	096[12.3 Sm	123 9.0 Ch
149 13.0 Pt	R OCT	155 8.9 Pt	120 7.4 Ht	120[12.3 Sm	125 8.7 Kl
SU TAU	*055686*	159 8.8 Jo	122 6.7 Bl	RY CAR	127 8.8 Kl
054319	107 11.6 Bl	159 9.5 Rt	R LMI	*111561*	130 8.6 Kl
134 9.5 L	123 11.8 Bl	S VOL	093934	109[13.1 Bl	136 8.3 Kl
145 9.6 Ca	X AUR	*073173*	155 11.4 Pt	RS CEN	138 8.5 Kl
147 9.6 Pt	060450	109[12.8 Bl	R LEO	*111661*	139 8.3 Pt
148 9.6 Ca	149 11.7 Pt	U CMI	094211	096[12.1 Sm	142 8.4 Kl
149 9.6 Ca	155 11.5 Kz	073508	144 7.5 Ch	109[13.1 Bl	144 8.2 Ca
149 9.5 Pt	155 11.8 Eb	134 9.6 L	155 6.8 Pt	120[13.1 Sm	144 8.5 Kl
154 9.8 Ca	V MON	155 10.5 Pt	Z VEL	X CEN	147 8.5 Kl
155 10.2 Kz	*061702*	S GEM	*094953*	*114441*	148 8.1 Kz
155 9.6 Eb	149 9.2 Pt	073723	096 10.9 Sm	109 13.0 Bl	148 8.2 Eb
155 9.6 Pt	R MON	155 9.9 Pt	097 11.2 Ht	W CEN	148 8.2 Jo
157 9.6 Pt	063308	T GEM	107 11.0 Bl	*115058*	148 8.7 Cb
158 9.5 Ca	149 10.6 Pt	074323	108 11.2 En	095 10.5 En	149 8.5 Kl
162 9.6 Pt	S LYN	155 8.4 Pt	112 12.1 Sm	107 11.3 Bl	151 8.5 Kl
164 9.6 Ca	063558	R CNC	119 11.8 Bl	111 11.5 Ht	154 8.3 Kl
Z TAU	149 13.0 Pt	081112	V LEO	112 11.2 Sm	158 7.8 Ca
054615a	X GEM	155 10.8 Pt	095421	113 11.4 En	U OCT
155 11.2 Eb	064030	Z CAM	155 10.8 Pt	119 11.9 En	*131283*
155 11.2 Kz	150[11.4 Bn	081473	RV CAR	119 11.9 Bl	097[13.2 Ht
RU TAU	W MON	126 13.5 L	*095563*	120 12.2 Ht	109 13.4 Bl
054615c	*064707*	V CNC	109[13.1 Bl	120 12.2 Sm	109 13.0 En
155[11.6 Kz	149 10.0 Pt	081617	S CAR	T CVN	113 12.9 En
U ORI	Y MON	155 12.1 Pt	*100661*	122532	119 13.2 Bl
054920a	065111	R CHA	095 6.1 En	139 9.8 Pt	120 12.9 Ht
144 7.0 Gb	149 10.2 Pt	*082476*	096 6.5 Sm	U CEN	122 12.9 En
144 6.6 Ch	X MON	107 12.2 Bl	097 6.4 Ht	*122854*	R HYA
145 6.4 Ca	*065208*	112[12.4 Sm	107 6.8 Bl	109 13.0 Bl	*132422*
148 6.9 Eb	134 7.8 L	S HYA	108 7.0 En	119 12.2 Bl	095 4.5 En
148 6.4 Jo	159 7.8 Rt	084803	111 7.0 Sm	T UMA	096 4.8 Sm
148 7.4 Kz	R LYN	155 11.1 Pt	111 7.5 Ht	123160	107 4.8 Bl
149 6.1 Pt	065355	T HYA	113 7.5 En	123 7.8 Ch	108 4.4 En
154 6.5 Ca	149 8.8 Pt	*085008*	116 8.3 Bl	125 7.9 Kl	111 4.4 En
159 6.6 Jo	R GEM	151 9.3 L	120 8.0 Ht	127 7.7 Kl	111 4.4 Sm
159 6.6 Rt	070122a	T CNC	120 8.0 Sm	130 7.8 Kl	119 4.4 En
164 6.6 Ch	145 11.0 Ca	085120	122 8.2 Bl	136 8.2 Kl	120 4.2 Sm
V CAM	149 10.6 Pt	155 8.2 Pt	Z CAR	138 8.2 Kl	120 4.4 Ch
054974	154 10.6 Ca	V UMA	*101058*	139 8.0 Pt	121 4.9 Bl
149 12.4 Pt	Z GEM	090151	109[12.6 Bl	142 8.2 Kl	124 4.0 En
Z AUR	070122b	126 10.3 L	112[12.3 Sm	144 8.3 Kl	S VIR
055353	149 12.4 Pt	139 10.2 L	W VEL	144 8.5 Ca	*132706*
139 9.8 Pt	TW GEM	RW CAR	*101153*	147 8.1 Kl	099 8.4 Sm
142 9.9 Pt	070122c	*091868*	096[12.0 Sm	148 8.5 Kz	111 9.0 Sm
143 10.0 Pt	145 8.1 Ca	109 12.6 Bl	109[12.5 Bl	148 8.4 Jo	120 9.3 Ch
144 10.0 Pt	149 7.9 Pt	119 12.2 Bl	R UMA	148 8.6 Eb	120 9.3 Ch
145 10.0 Pt	154 8.2 Ca	Y VEL	103769	148 8.6 Cb	RV CEN
147 9.5 Pt	R CMI	*092551*	139 9.0 Pt	149 8.5 Kl	*133155*
148 10.4 Kz	070310	109[12.4 Bl	148 9.5 Cb	151 8.6 Kl	107 9.0 Bl
148 9.9 Jo	134 7.2 L	122[12.4 Bl	154 10.2 Ca	154 8.8 Kl	116 9.4 Bl

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1927.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
RV CEN	R CEN	S APS	R NOR	R CRB	RZ SCO
133155	*140959*	*145971*	*152849*	154428	*155823*
122 9.4 Bl	099 7.3 Sm	095 10.0 En	108 12.8 En	144 6.2 Pt	111 11.6 Ht
T UMI	107 7.0 Bl	096 10.4 Sm	109 13.0 Bl	144 6.1 Ca	113 9.9 En
133273	108 7.0 En	099 10.4 Sm	113 12.8 En	145 6.1 Ca	120 9.9 En
148 9.2 Kz	111 6.8 Ht	107 10.0 Bl	119 12.8 En	145 6.1 Pt	120 12.2 Ht
148 9.0 Eb	113 6.8 En	108 10.0 En	124 12.8 Sm	147 6.2 Pt	124 11.2 Sm
152 8.8 Jo	114 6.4 Sm	113 9.9 En	X LIB	147 6.1 Kl	139 12.5 Pt
T CEN	116 6.7 Bl	114 10.4 Sm	*153020*	148 6.1 Ca	Z SCO
133633	119 6.6 En	116 10.0 Bl	109[12.2 Bl	149 6.1 Ca	*160021*
095 7.8 En	122 6.2 Bl	119 10.0 En	W LIB	149 6.2 Pt	107 10.1 Bl
097 8.1 Ht	124 6.5 Sm	122 10.0 Bl	*153215*	149 6.1 Kl	108 10.0 En
099 8.2 Sm	U UMI	Y LIB	107 11.1 Bl	151 6.5 Kl	111 10.1 Ht
107 7.6 Bl	141567	*150605*	119 11.4 Bl	151 6.2 Pt	113 9.9 En
108 8.0 En	121 9.3 Ch	143[12.4 L	122 11.7 Bl	152 6.1 Pt	116 9.9 Bl
111 7.4 Ht	139 9.0 Pt	S LIB	143 12.5 L	153 6.0 Be	120 10.1 Ht
113 7.8 En	148 8.6 Eb	*151520*	S UMI	153 6.0 L	120 9.9 En
116 7.6 Bl	148 8.4 Kz	123 8.4 Ch	153378	153 6.0 Ca	122 10.0 Bl
119 7.1 En	149 8.0 Jo	133 8.0 L	114 10.7 Sg	154 6.0 Ca	124 10.1 Sm
120 6.7 Ht	155 8 5 Jo	141 8.5 Ch	139 9.0 Pt	154 6.3 Kl	133 10.1 L
120 6.8 Sm	S Boo	S SER	148 9.5 Eb	155 5.8 Kz	143 10.0 L
122 7.4 Sm	141954	151714	148 9.0 Kz	155 5.9 Ca	R HER
122 6.5 Bl	119 9.3 Ch	125 9.1 L	149 8.8 Jo	156 6.1 Pt	160118
RT CEN	123 10.9 Sg	130 8.8 L	U LIB	157 6.1 Pt	097 9.0 GC
134236	139 10.2 L	130 8.7 Be	*153620a*	158 6.2 Pt	119 9.6 Ch
108 12.4 En	139 10.1 Pt	139 9.0 Pt	107 11.2 Bl	158 6.0 Ca	122 9.4 GC
109 12.9 Bl	148 9.7 Eb	146 9.2 Ya	119 12.3 Bl	159 6.0 Ca	136 10.0 By
111 11.7 Ht	148 10.0 Kz	148 9.1 Ca	T NOR	159 6.2 Pt	139 10.5 Pt
112 13.0 Sm	152 9.7 L	152 9.3 L	*153654*	164 6.0 Ca	147 11.4 GC
114 12.4 En	169 9.2 Kz	155 9.6 Ca	097[12.8 Ht	167 5.8 Cl	U SER
119 12.0 En	169 8.9 Eb	168 10.2 Ca	120 12.8 Ht	168 6.1 Pt	160210
119 13.0 Bl	V Boo	S CRB	124 12.8 Sm	168 6.1 Ca	139 11.6 Pt
120 11.4 Ht	142539a	151731	Z LIB	169 6.0 Ca	148 9.7 Ca
120 12.4 Sm	119 9.3 Ch	123 12.0 Sg	*154020*	169 5.9 Kz	169 8.8 Ca
R CVN	139 8.8 Pt	139 11.7 Pt	109[11.9 Bl	169 6.5 Eb	169 8 3 Al
134440	144 9.0 Ca	140 12.0 Ch	R CRB	169 6.5 Rw	X SCO
139 8.0 Pt	148 9.1 Eb	148 11.7 Ca	154428	X CRB	*160221a*
148 8.5 Eb	148 9.1 Kz	155 10.8 Eb	114 6.2 Sg	154536	107 10.8 Bl
148 8.6 Kz	169 8.7 Kz	155 11.0 Kz	118 6.1 Ch	139 9.8 Pt	116 10.8 Bl
RX CEN	169 8 5 Eb	168 10.0 Ca	123 6 2 Sg	169 11.1 Eb	122 11.0 Bl
134536	169 7.9 Ca	169 9.5 Eb	121 5.9 Ch	169 11.4 Kz	SX HER
107 12.4 Bl	R CAM	169 10.0 Kz	125 5.7 Kl	R SER	160325
T APS	142584	RS LIB	125 5.9 Ch	154615	130 8.4 L
134677	119 8.1 Ch	*151822*	126 6.0 Be	117 13.1 GC	130 8.4 Be
094 12.3 En	145 8.7 Ca	107 8.6 Bl	127 6.1 Kl	139 13.6 Pt	139 8.6 Pt
108 12.3 En	R Boo	108 9.5 En	130 5.8 Kl	148 12.5 Ca	140 8.7 Pt
109 12.3 Bl	143227	113 9.5 En	130 6.0 Be	168 11.0 Ca	143 8.7 Pt
113 12.3 En	119 9.9 Ch	116 8 6 Bl	130 6.0 L	V CRB	143 8.9 L
119 11.5 Bl	139 11.1 Pt	119 8.6 En	132 6.0 L	154639	144 8.6 Pt
122 11.7 En	148 11.4 Ca	120 8.6 Ht	134 6.0 L	139 6.7 Pt	145 8.4 Pt
RU HYA	U Boo	122 8.0 Bl	136 6.1 Kl	144 7.1 Ca	147 8.6 Pt
140528	144918	124 7.9 Sm	137 6.0 Be	168 7.5 Ca	149 8.4 Pt
080[12.5 En	117 10.9 GC	133 8.2 L	139 6.2 Pt	RR LIB	151 8.2 Pt
109[13.5 Bl	Y LUP	RU LIB	140 6.1 Pt	*155018*	152 8.1 Pt
114[12.5 En	*145254*	*152714*	140 6.2 Ch	123 12.1 Ch	152 8 3 L
124[12.5 Sm	099 10.3 Sm	130 8.1 L	142 6.1 Pt	141 11.9 Ch	156 8.0 Pt
R CEN	107 10.4 Bl	139 8.6 Pt	142 6.1 Kl	143 11.7 L	157 8.0 Pt
140959	116 10.6 Bl	143 8.7 L	143 6.0 Be	RZ SCO	158 8.0 Pt
095 7.5 En	120 11.0 Sm		143 6.3 Pt	*155823*	159 8.0 Pt
097 7.6 Ht	122 10.7 Bl		143 6.1 L	108 10.0 En	167 7.9 Pt

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1927.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
W Sco	U Her	S Dra	RW Sco	U Ara	RY Oph
160519	162119	164055	*170833*	*174551*	181103
109[12.0 Bl	139 7.4 Pt	153 8.3 By	107 10.3 Bl	122[12.3 En	148 12.3 Ca
RU Her	140 8.0 Ch	RR Oph	116 10.8 Bl	RT Oph	155 11.7 Ca
160625a	142 8.2 Kl	*164319*	122 11.3 Bl	175111	168 10.6 Ca
130 13.1 L	144 8.0 Ca	108 11.2 En	Z Oph	140 10.3 Pt	W Lyr
136 13.3 GC	146 8.7 By	113 11.2 En	171401	T Dra	181136
148 13.4 GC	147 8.2 Kl	120 11.8 En	140 7.9 Pt	175458a	140 8.7 Pt
152 13.4 L	149 8.2 Kl	139 12.3 Pt	148 7.8 Ca	098 12.0 GC	145 8.7 Ca
R Sco	149 7.4 Jo	S Her	151 8.3 Sp	116 12.2 GC	148 8.3 Jo
161122a	150 8.4 Cb	164715	155 7.6 Ca	126[12.6 GC	150 8.6 Cb
109[12.6 Bl	153 9.1 By	119 11.4 Ch	156 7.9 Sp	146[12.6 GC	154 8.5 Ca
120[12.6 Ht	154 8.4 Kl	136 10.1 By	158 7.7 Sp	RY Her	159 8.3 Jo
124 12.2 Sm	155 8.5 Jo	139 10.1 Pt	160 7.8 Sp	175519	169 8.3 Hu
S Sco	158 8.7 Ca	142 10.3 By	167 7.9 Cl	118 11.8 Ch	169 8.3 Al
161122b	169 8.3 Hu	148 9.5 Ca	168 7.8 Ca	124 12.0 Ch	170 8.3 Jo
107 11.4 Bl	SS Her	153 9.8 By	169 7.6 Sp	140 12.8 Pt	RV Sgr
109 10.9 En	162807	168 9.1 Ca	RS Her	V Dra	*182133*
111 11.5 Ht	133 10.2 L	RS Sco	171723	175654	107 10.4 Bl
114 11.9 En	138 9.4 GC	*164844*	140 8.5 Pt	140 13.9 Pt	116 10.6 Bl
116 11.7 Bl	139 9.2 Pt	109 12.5 En	S Oct	R Pav	122 9.8 Bl
120 12.5 Ht	146 9.2 GC	110 11.4 Bl	*172486*	*180363*	SV Her
120 12.6 En	153 9.0 GC	111 11.5 Ht	097[12.8 Ht	097[12.3 Ht	182224
122 12.4 Bl	153 9.5 L	114 11.3 En	110[13.0 Bl	113[11.9 Sm	130 10.7 L
W CrB	T Oph	116 11.2 Bl	113[12.8 En	120[12.3 Ht	130 10.8 Be
161138	*162815*	120 11.4 Ht	120[12.8 Ht	T Her	140 11.2 Pt
139 8.8 Pt	109[12.8 Bl	120 11.3 En	RU Oph	180531	152 12.1 L
148 9.4 Eb	S Oph	122 11.2 Bl	172809	114[13.4 GC	T Ser
148 9.1 Kz	*162816*	RR Sco	140 12.6 Pt	126 12.5 GC	182306
148 9.5 Sp	110[12.6 Bl	*165030*	RT Ser	133 12.1 L	140 11.6 Pt
149 9.7 Ca	W Her	107 8.5 Bl	*173212*	135 11.0 GC	146 9.7 Ya
151 9.8 Sp	163137	109 8.4 En	153 12.4 L	140 11.0 Pt	156 10.0 Sp
156 10.0 Sp	118 10.2 Ch	111 8.4 Ht	RU Sco	141 10.8 GC	160 9.9 Sp
169 10.8 Sp	139 8.7 Pt	114 8.5 En	*173543*	142 11.1 Ch	169 9.7 Sp
169 10.6 Kz	140 8.5 Ch	116 8.5 Bl	107 9.6 Bl	145 10.9 Ca	X Oph
169 10.8 Eb	148 8.6 Sp	120 9.0 En	116 8.9 Bl	147 10.7 GC	183308
169 10.9 Ca	148 8.4 Kz	120 9.1 Ht	122 8.7 Bl	149 9.8 Jo	130 7.2 Be
W Oph	148 8.5 Jo	122 9.0 Bl	SV Sco	150 10.1 Cb	130 7.3 L
161607	148 8.4 Eb	124 9.5 Sm	*174135*	152 10.0 L	140 7.0 Pt
120 10.3 Ch	149 8.6 Ca	SS Oph	110[12.2 Bl	153 9.6 Ca	140 7.1 Ch
133 10.6 L	151 8.5 Sp	165202	W Pav	159 9.2 Jo	148 6.6 Ca
139 10.7 Pt	155 8.4 Jo	140 13.5 Pt	*174162*	164 9.1 Ca	148 6.8 Jo
141 10.8 Ch	156 8.4 Sp	RV Her	095 9.0 En	169 8.7 Al	152 6.7 L
143 10.7 L	169 8.4 Sp	165631	096 9.4 Sm	170 8.7 Jo	153 6.7 Ya
153 11.2 L	169 8.5 Kz	140 14.4 Pt	097 9.2 Ht	W Dra	155 6.7 Jo
V Oph	169 8.5 Eb	148 13.3 Cl	107 9.3 Bl	180565	159 6.5 Jo
162112	169 8.6 Ca	167[13.5 Cl	108 9.6 En	140 12.3 Pt	169 6.5 Al
139 7.1 Pt	170 8.6 Jo	RT Sco	111 9.8 Ht	X Dra	T Aql
141 8.1 Ch	R Dra	*165636*	113 10.2 Sm	180666	184008
U Her	163266	110[13.0 Bl	113 9.6 En	140 11.7 Pt	150 9.5 By
162119	118 8.2 Ch	R Oph	116 9.6 Bl	Nov Oph	RV Lyr
118 7.8 Ch	139 8.5 Pt	*170215*	120 10.1 Ht	180911	184134
122 9.7 GC	148 9.2 Eb	120 11.6 Ch	120 9.9 En	140[12.0 Pt	140 10.8 Pt
125 8.3 Kl	148 8.9 Jo	140 10.6 Pt	122 10.1 Bl	TV Her	164 11.8 Ie
127 8.4 Kl	148 9.2 Kz	141 10.0 Ch	RS Oph	181031	R Sct
130 7.8 Kl	154 9.3 Ca	169 8.5 Al	174406	133 10.0 L	*184205*
136 8.4 Kl	159 9.4 Jo	RT Her	140 11.1 Pt	152 10.2 L	114 5.1 Sg
136 8.6 By	169 10.1 Kz	170627	U Ara	RY Oph	118 5.5 Ch
138 8.4 Kl	169 10.6 Eb	140 9.7 Pt	*174551*	181103	121 5.5 Ch
139 8.4 Kl	170 9.8 Jo		095[12.3 En	140 12.6 Pt	125 5.6 Ch

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1927.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
R SCT	R SCT	RW SGR	RY SGR	RT AQL	RU SGR
184205	*184205*	*190819a*	*191033*	193311	*195142*
125 5.2 L	168 7.8 Pt	118 9.7 Ch	107 7.0 Bl	167 12.7 Cl	108 7.5 Bl
125 5.3 Be	168 7.5 Ca	140 9.7 Pt	108 7.1 En	R CYG	108 7.2 En
129 5.3 Lg	169 7.4 Ca	143 9.6 Ch	110 7.1 Bl	193449	111 7.0 Sm
130 5.4 Lg	169 7.7 Sp	TY AQL	111 7.1 Ht	098 12.6 GC	111 7.3 Ht
130 5.1 Be	169 7.8 Al	190907	111 6.9 Sm	138[12.6 GC	116 7.6 Bl
130 5.1 L	170 7.6 Ie	140 10.3 Pt	112 6.9 Sm	143 13.7 Pt	120 7.2 Ht
135 5.2 Lg	170 7.6 Jo	148 10.4 Ca	113 7.1 En	RV AQL	120 7.0 Sm
136 5.4 Lg	NOV AQL	S LYR	114 7.0 Sm	193509	120 7.2 En
137 5.7 Be	184300	190925	116 7.2 Bl	143 9.1 Pt	122 7.5 Bl
139 6.0 Pt	114 10.7 Sg	124[12.0 Ch	118 7.0 Ch	TT CYG	RR AQL
140 6.0 Pt	123 10.4 Ch	X LYR	119 7.3 En	193732	*195202*
140 5.7 Lg	139 11.4 Pt	190926	119 7.4 Bl	098 7.8 GC	143 8.0 Pt
141 5.8 Lg	147 11.3 Pt	097 8.3 GC	120 7.3 Ht	157 7.0 Hu	147 7.9 Ya
142 6.1 Pt	148 10.4 Ca	140 9.0 Pt	120 7.3 Sm	T PAV	RS AQL
143 5.8 Ch	158 11.2 Pt	153 8.9 By	122 7.4 Bl	*193972*	*195308*
143 6.2 Pt	165 10.8 Ie	RS LYR	125 6.9 L	095 11.7 En	148[12.8 Ca
144 6.2 Pt	168 11.2 Pt	190933a	137 6.4 L	096 12.0 Sm	NOV CYG
145 6.3 Pt	RX LYR	124 12.1 Ch	139 6.3 Pt	097 11.9 Ht	195553
146 6.4 Ya	185032	140 11.2 Pt	140 6.3 Pt	108 12.3 Bl	168[12.8 Pt
147 6.6 Pt	124[12.5 Ch	142 11.3 Ch	143 6.3 Pt	109 12.5 En	Z CYG
147 6.5 Gb	S CRA	RU LYR	143 6.4 L	111 12.6 Ht	195849
147 6.7 Sp	*185437a*	190941	143 6.6 Ch	113 12.5 En	143 11.5 Pt
148 6.8 Sp	110 11.9 Bl	153[11.4 Ya	144 6.3 Pt	120 13.0 Ht	S TEL
148 6.9 Lg	119 12.0 Bl	168 13.3 Ie	145 6.2 Pt	122 13.2 En	*195855*
148 6.3 Cb	ST SGR	U DRA	146 5.3 Ya	RT CYG	110[12.6 Bl
148 6.8 Jo	*185512a*	190967	147 6.3 Pt	194048	SY AQL
148 6.4 Ca	143[14.0 L	140 13.6 Pt	149 6.3 Pt	098 11.6 GC	200212
149 6.8 Ca	R CRA	W AQL	151 6.3 Pt	143 9.8 Pt	143 13.1 Pt
149 6.6 Pt	*185537a*	*191007*	156 6.3 Pt	148 10.0 Jo	143 13.9 L
150 6.8 Pt	110 13.0 Bl	148[12.6 Ca	157 6.4 Pt	157 8.6 Hu	153 13.9 L
150 6.9 Cb	119 12.1 Bl	T SGR	158 6.4 Pt	159 8.6 Jo	S CYG
151 6.9 Pt	T CRA	*191017*	159 6.2 Pt	164 8.4 Ca	200357
151 7.1 Sp	*185537b*	118 9.5 Ch	168 6.2 Pt	165 8.3 Al	114 12.7 Sg
152 6.9 Pt	110[13.0 Bl	140 8.3 Pt	TV SGR	170 7.9 Jo	143 14.6 Pt
152 7.0 L	119[13.0 Bl	142 8.1 GC	*191124*	TU CYG	R CAP
153 7.5 Ca	RT LYR	143 8.5 Ch	107 10.7 Bl	194348	*200514*
153 7.4 Sp	185737	145 8.4 GC	116 10.7 Bl	118[11.2 Ch	143 12.1 Pt
154 7.5 Ca	124[12.0 Ch	155 8.3 Kz	122 11.3 Bl	X AQL	SV CYG
155 7.8 Ca	V AQL	155 8.6 Eb	S SGR	194604	200647
155 7.8 Jo	*185905*	170 8.6 Ya	*191310a*	143 13.5 Pt	153 9.5 By
156 7.7 Sp	148 7.5 Cb	R SGR	110[12.9 Bl	168[12.9 Ie	S AQL
156 7.6 Pt	150 7.3 Cb	*191019*	145[13.4 GC	χ CYG	200715a
157 7.6 Pt	R AQL	118 7.0 Ch	SW SGR	194632	123 9.5 Ch
158 8.0 Pt	190108	140 8.0 Pt	*191331*	143 12.3 Pt	142 9.9 GC
158 8.1 Ca	118 6.6 Ch	143 8.2 Ch	110 13.0 Bl	148 11.8 Eb	143 9.8 Pt
158 8.0 Sp	140 6.9 Pt	144 8.3 Ca	TZ CYG	148 11.8 Kz	153 10.8 GC
158 8.6 Lg	147 6.8 Ya	147 8.3 Ya	191350	169[12.5 Cl	164 9.1 Cl
159 8.6 Lb	148 7.4 Ca	148 8.4 Sp	140 10.7 Pt	RR SGR	RW AQL
159 8.2 Sp	168 8.1 Ca	156 8.6 Sp	U LYR	*194029*	200715b
159 8.2 Jo	V LYR	168 9.8 Ca	191637	107 7.7 Bl	143 9.1 Pt
159 7.9 Pt	190529a	169 10.1 Sp	140 10.2 Pt	116 7.7 Bl	R TEL
159 8.2 Ca	140 11.3 Pt	RY SGR	TY CYG	122 8.4 Bl	*200747*
160 8.3 Sp	RX SGR	*191033*	192928	RU SGR	108 9.0 Bl
163 8.3 Sp	*190818*	095 7.0 En	124 10.1 Ch	*195142*	116 8.6 Bl
164 8.1 Pt	118 9.7 Ch	096 6.9 Sm	140 11.1 Pt	095 7.6 En	122 8.5 Bl
164 8.3 Ca	140 10.2 Pt	097 6.9 Ht	RT AQL	097 7.7 Ht	W CAP
165 8.1 Ie	143 10.0 Ch	098 7.0 En	193311	098 7.4 En	*200822*
168 7.7 Ie		099 6.8 Sm	140 13.6 Pt	099 7.6 Sm	110[12.8 Bl

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1927.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
W CAP	U CYG	S DEL	RZ CYG	X PEG	R GRU
200822	201647	203816	204846	211614	*214247*
119 12.3 Bl	148 10.0 Jo	143 10.2 Pt	158 9.9 Ya	143 9.5 Pt	120 11.2 Sm
143 11.2 Pt	153 11.4 Sp	V CYG	170 10.2 Ie	T CAP	120 11.2 Ht
Z AQL	153 11.0 By	203847	S IND	*211615*	122 11.4 Bl
200906	154 9.3 Ca	143 12.3 Pt	*204954*	120[13.0 Bl	V PEG
143 12.1 Pt	156 11.4 Sp	158 9.5 Ya	108 12.3 Bl	S MIC	215605
R SGE	156 10.0 Ya	Y AQR	X DEL	*212030*	143 9.5 Pt
200916	158 11.1 Sp	*203005*	205017	112 13.0 Sm	U AQR
164 9.0 Cl	159 9.5 Jo	124 11.4 Ch	143 13.7 Pt	120 13.1 Bl	*215717*
RS CYG	165 9.2 Al	143 9.5 Ch	R VUL	T CAP	143 11.4 Pt
200938	169 11.3 Sp	143 9.7 Pt	205923	*212814*	RT PEG
118 7.2 Ch	170 9.8 Jo	158 9.2 Ya	123 9.1 Sg	120[12.9 Bl	215934
120 7.2 Ch	170 9.6 Gb	170 9.8 Ie	143 11.2 Pt	143[11.2 Ch	121 9.6 Ch
123 7.2 Ch	U MIC	T DEL	RS CAP	W CYG	143 11.0 Pt
125 6.8 L	*202240*	204016	*210116*	213244	RZ PEG
140 7.1 Ch	108 8.8 Bl	143 13.8 Pt	150 8.7 By	130 6.5 L	220133b
143 7.0 Ch	116 7.9 Bl	148 13.6 Cl	V CAP	133 5.7 Go	143 9.4 Pt
143 7.3 L	122 7.9 Bl	V AQR	*210124*	134 6.5 L	T PEG
143 7.3 Pt	SV CYG	204102	110[12.7 Bl	143 6.2 L	220412
143 7.2 Be	202247	124 8.7 Ch	TW CYG	153 5.9 L	116[13.7 GC
148 7.2 Jo	157 8.2 Hu	136 8.6 By	210129	155 5.6 Go	126 14.0 L
149 7.0 Al	SZ CYG	143 8.0 Pt	164 10.0 Ie	180 5.9 Go	153[13.7 L
153 7.3 Be	202946	146 8.4 By	X CAP	S CEP	153[13.7 GC
153 7.3 L	139 9.5 Pt	158 8.3 Ya	*210221*	213678	T GRU
156 7.4 Sp	140 9.6 Pt	W AQR	120[12.7 Bl	143 8.3 Pt	*221938*
158 **7.5 Ya**	142 9.0 Pt	*204104*	X CEP	148 8.5 Jo	099 10.7 Bl
159 7.1 Jo	143 8.9 Pt	132 11.5 L	210382	157 9.0 Hu	112 10.1 Bl
160 7.2.Sp	144 8.9 Pt	152 12.3 L	122 10.0 GC	159 8.7 Jo	115 9.8 En
165 7.1 Al	145 9.1 Pt	U CAP	126 10.5 GC	170 8.7 Jo	120 9.4 Bl
168 7.1 Al	147 9.4 Pt	*204215*	128 10.6 By	RU CYG	122 9.6 En
170 7.5 Gb	149 9.5 Pt	110 12.5 Bl	136 10.4 GC	213753	S GRU
170 7.0 Jo	150 9.2 Pt	119 11.3 Bl	165 10.7 Al	128 8.7 By	*221948*
R DEL	151 9.6 Pt	V DEL	RS AQR	142 8.4 By	109 12.6 En
201008	152 9.6 Pt	204318	*210504*	143 8.3 Pt	111 12.8 Bl
143 12.2 L	155 9.6 Pt	102 10.8 GC	116[13.5 GC	144 8.5 Ch	114 12.8 En
143 12.4 Pt	156 9.6 Pt	114 9.5 GC	126 14.3 L	144 8.4 GC	119 12.8 En
153 11.7 L	157 9.5 Pt	122 9.4 GC	141[13.3 GC	RV CYG	120[12.8 Sm
169 11.4 Sp	158 9.4 Pt	126 9.3 GC	153 12.6 L	213937	120 12.7 Bl
RT CAP	159 9.4 Pt	127 9.3 By	Z CAP	126 6.8 L	S LAC
201121	162 9.0 Pt	135 9.0 GC	*210516*	143 6.4 Pt	222439
143 7.0 Pt	164 9.0 Pt	141 9.0 GC	143 10.6 Pt	152 6.7 L	126 7.9 L
SX CYG	168 9.5 Pt	145 9.0 GC	R EQU	169 7.2 Hu	127 7.7 Ch
201130	ST CYG	153 9.1 GC	210812	RR PEG	141 8.2 Ch
143 11.6 Pt	202954	T AQR	167[13.0 Cl	214024	143 8.1 Pt
170 8.6 Ie	143 10.4 Pt	*204405*	T CEP	143 13.2 Pt	152 8.6 L
RT SGR	157 10.6 Hu	143 11.7 Pt	210868	167 13.1 Cl	164 9.7 Ie
201139	158 10.2 Ya	148 11.3 Ca	118 6.3 Ch	R GRU	168 9.9 Al
110 12.5 Bl	164 10.7 Ie	150 11.6 Cb	125 6.2 Ch	*214247*	R IND
WX CYG	V VEL	151 11.0 Sp	126 5.7 L	095 10.0 En	*222867*
201437b	203226	153 11.0 Sp	143 6.1 Pt	097 10.3 Ht	108 9.8 Bl
143 12.0 Pt	143 8.7 Pt	154 10.9 Ca	145 6.4 Ca	098 10.0 En	116 9.0 Bl
158 11.5 Ya	R MIC	156 10.9 Sp	148 6.0 Jo	099 10.1 Sm	122 8.5 Bl
165 11.2 Al	*203429*	158 10.7 Sp	159 6.0 Jo	108 10.6 Bl	T TUC
U CYG	110 12.8 Bl	158 10.5 Ya	165 6.5 Al	109 10.1 En	*223462*
201647	119 11.6 Bl	169 9.3 Ca	168 6.5 Ca	111 10.3 Ht	097 10.9 Ht
114 9.0 Sg	Y DEL	169 9.3 Sp	170 6.0 Jo	112 10.7 Sm	099 10.9 Sm
136 10.5 By	203611	RZ CYG	RR AQR	114 10.3 En	109 10.9 En
143 9.4 Pt	167[12.0 Cl	204846	*210903*	116 11.3 Bl	111 10.7 Ht
146 10.7 By		143 9.5 Pt	143 9.5 Pt	119 10.6 En	112 10.9 Sm

VARIABLE STAR OBSERVATIONS RECEIVED DURING OCTOBER, 1927.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
T TUC	R PEG	W PEG	V PHE	R AQR	R TUC
223462	230110	231425	*232746*	*233815*	*235265*
114 10.8 En	143 9.8 Pt	130 8.6 Kl	114 10.0 En	114 8.9 En	109[12.6 En
120 10.3 En	147 10.1 Kl	136 8.6 Kl	119 9.8 En	116 8.8 Bl	112 12.4 Sm
120 10.4 Ht	149 11.0 Ca	138 8.4 Kl	120 9.6 Ht	118 8.8 Ch	120 9.9 En
R LAC	151 10.0 Kl	142 8.3 Kl	Z AND	120 8.8 Ht	R CAS
223841	154 10.0 Kl	144 8.4 Kl	232848	122 8.7 Bl	235350
114 12.7 GC	170 11.3 Ie	147 8.4 Kl	141 9.6 Ch	122 8.9 En	121 6.4 Ch
126 13.9 L	V CAS	149 8.5 Kl	143 9.6 Pt	141 8.9 GC	141 6.6 Ch
146[13.5 GC	230759	150 8.3 Al	ST AND	143 9.2 Pt	148 7.0 Jo
S AQR	127 7.0 Ch	151 8.4 Kl	233335	145 9.4 Ca	149 7.1 Ca
225120	143 7.1 Pt	154 8.4 Kl	118 8.7 Ch	153 9.9 GC	155 7.5 Jo
116 12.8 GC	149 7.1 Jo	169 8.9 Al	143 8.7 Pt	168 9.6 Al	169 7.3 Ca
RW PEG	155 8.0 Jo	S PEG	149 9.4 Ca	RS AND	170 7.5 Jo
225914	155 7.7 Ca	231508	150 9.8 Al	235048	Z PEG
143 13.2 Pt	169 8.7 Ca	125 7.5 Ch	158 9.3 Al	150 9.4 By	235525
R PEG	W PEG	143 7.5 Pt	168 9.1 Al	RR CAS	143 8.7 Pt
230110	231425	V PHE	170 9.3 Hu	235053	170 9.8 Ie
125 9.9 Kl	125 8.7 Kl	*232746*	R AQR	153 11.6 Bn	SV AND
125 9.7 Ch	126 8.5 L	099 10.6 Sm	*233815*	157 11.3 Bn	235939
127 9.7 Kl	127 8.5 Ch	109 10.4 En	109 8.9 En	V CET	143 9.8 Pt
130 9.7 Kl	127 8.6 Kl	110 10.4 Ht	110 8.4 Bl	*235209*	157 9.3 Hu
142 10.1 Kl			111 8.8 Ht	120[13.0 Bl	

RAPIDLY VARYING IRREGULAR VARIABLES.

Star	J.D.	Est.Obs.	J.D.	Est.Obs.
005840 RX ANDROMEDAE—				
	5139.7	[12.4 Pt	5152.7	[12.4 Pt
	5140.7	13.2 Pt	5155.8	11.0 Pt
	5142.8	11.5 Pt	5156.7	11.5 Pt
	5143.7	11.4 Pt	5157.7	11.7 Pt
	5144.7	11.5 Pt	5158.7	[12.4 Pt
	5145.7	11.7 Pt	5159.7	[11.7 Pt
	5147.7	[12.4 Pt	5162.8	[11.7 Pt
	5149.7	[12.4 Pt	5168.7	11.5 Pt
	5150.7	[12.4 Pt		
060547 SS AURIGAE—				
	5125.4	13.0 L	5152.4	[14.5 L
	5126.4	[14.5 L	5154.2	[12.4 Ca
	5134.6	[12.4 L	5155.2	[12.4 Ca
	5137.4	[11.5 L	5157.9	[12.6 Pt
	5142.8	[12.4 Pt	5158.1	[12.4 Ca
	5143.4	[13.5 L	5162.8	[12.4 Pt
	5145.2	[12.4 Ca	5164.7	[11.0 Pt
	5147.9	[12.6 Pt	5167.6	[11.0 Cl
	5148.2	[12.4 Ca	5168.7	[12.6 Pt
	5149.9	[12.6 Pt	5169.6	11.8 Cl
	5151.6	[12.4 L	4170.6	10.8 Ie
074922 U GEMINORUM—				
	5134.6	[12.4 L	5151.6	[13.7 L
	5144.4	[10.2 Ch	5154.3	[12.4 Ca
	5145.3	[12.4 Ca		
213843 SS CYGNI—				
	5114.6	8.6 GC	5122.6	8.5 GC
	5114.7	8.5 Sg	5123.2	8.7 Ch
	5118.2	8.3 Ch	5123.7	8.9 Sg
	5119.2	8.3 Ch	5124.1	8.5 Ch
	5120.1	8.3 Ch	5125.2	9.0 Ch
	5121.1	8.3 Ch	5125.3	9.4 Kl
	5122.2	8.3 Ch	5125.4	9.4 L

Star	J.D.	Est.Obs.	J.D.	Est.Obs.
213843 SS CYGNI—				
	5126.4	9.9 L	5147.7	11.7 Pt
	5127.1	10.2 Ch	5148.0	11.6 Ca
	5127.3	10.2 Kl	5149.0	11.6 Ca
	5127.4	9.9 L	5149.6	11.8 Al
	5128.3	10.4 Kl	5149.9	11.8 Pt
	5128.6	11.8 By	5150.7	11.7 Pt
	5130.3	10.8 Be	5151.7	11.7 Pt
	5130.3	10.9 Kl	5152.4	12.0 L
	5132.3	11.1 Be	5152.7	11.8 Pt
	5132.3	11.1 L	5153.4	11.8 L
	5133.3	11.3 L	5155.2	11.9 Ca
	5134.3	11.1 L	5155.8	11.7 Pt
	5134.3	11.1 Be	5156.7	11.7 Pt
	5135.1	11.6 Ch	5157.7	11.7 Pt
	5136.5	11.7 By	5158.1	11.8 Ca
	5137.4	11.2 L	5158.6	11.5 Ya
	5138.7	12.0 GC	5158.7	11.7 Pt
	5139.3	11.5 L	5159.7	11.7 Pt
	5139.3	11.5 Be	5160.6	11.2 Cl
	5139.7	11.7 Pt	5162.8	11.7 Pt
	5140.2	11.8 Ch	5164.2	8.7 Ca
	5140.7	11.8 Pt	5164.5	9.0 Ie
	5142.1	11.9 Ch	5164.7	9.0 Pt
	5142.8	11.7 Pt	5165.5	8.5 Ie
	5143.4	12.0 L	5167.5	8.9 Cl
	5143.4	12.0 Be	5168.6	9.0 Ie
	5143.7	11.9 Pt	5168.6	9.2 Al
	5144.1	12.0 Ch	5168.7	9.2 Pt
	5144.4	12.1 L	5169.6	9.2 Eb
	5144.7	11.9 Pt	5169.6	9.0 Cl
	5145.3	11.9 Ca	5169.6	9.4 Hu
	5145.6	12.1 By	5169.7	9.4 Kz
	5145.7	11.9 Pt	5170.5	9.8 Ie
			5170.6	9.3 Jo

taking as his subject, "The Story of an Association," reviewed the history of the A.A.V.S.O., giving many statistical facts concerning the make-up of the membership and the equipment used by its members. President Pickering, taking as his subject, "The Story of an Astronomical Pilgrim," recounted his recent travels through Europe, where he visited many of the astronomers and observatories of Germany, France, and other countries. His talk was exceedingly interesting and well illustrated with lantern slides of his own making.

The election of Council Members resulted in the addition of Mr. A. W. Butler of New York as the new member for a term of two years, and the re-election of Miss Harwood of Nantucket, Mr. Olcott of Norwich, Conn., and Mr. Fisher of Cambridge, Mass. The election of officers for the ensuing year followed immediately, with David B. Pickering, of East Orange, N. J., as President; and the re-election of Miss Farnsworth as Vice President, Mr. Olcott, as Secretary, and Mr. Jordan as Treasurer.

The Annual Report presented herewith indicates the continued interest in variable star observing and bespeaks a bright and flourishing future for the Association. Seventy-five observers took part in the observing program during the past year, securing a total of 17,600 observations on 470 variables. The average output has been nearly 15,000 observations per year, and the list of stars under observation has steadily increased so that now nearly 500 variable stars are under more or less regular observation.

MONTHLY SUMMARY.

Observer	Initial	Vars.	Observations	Observer	Initial	Vars.	Observations
Allen, P. R.	Al	17	22	Iedema	Ie	16	21
Baldwin	Bl	87	164	Jones	Jo	31	66
Barry	By	15	26	Kohl	Kl	8	68
Benini	Be	9	20	Kurtz	Kz	43	55
Brown	Bn	3	5	Lacchini	L	54	110
Carr	Ca	60	130	Logan	Lg	1	9
Chandra	Ch	76	116	Peltier	Pt	200	340
Cherrington	Cb	11	13	Rittenberg	Rt	6	6
Clement	Cl	15	20	Rowley	Rw	2	2
Ebert	Eb	40	52	Skaggs	Sg	11	13
Ensor	En	38	112	Smith	Sm	39	71
Gaebler	Gb	6	6	Spears	Sp	12	45
Gomi	Go	2	6	Yalden	Ya	20	20
Houghton	Ht	30	62	Georgetown	GC	25	54
Hunter	Hu	20	20	Coll. Obs.	—	—	—
				Totals	29	354	1654

ANNUAL REPORT OF THE AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS FOR 1927.

Observer	Initial	January	February	March	April	May-June	July-Aug.	September	October	November	December	Totals
Allen, L. B.	Ae	..	24	9	23	28	16	6	..	..	..	106
Allen, P. R.	Al	2	7	..	6	13	10	..	..	..	22	60
Ancarani	An	..	..	..	..	..	..	..	..	38	..	38
Baldwin	Bl	195	64	43	160	143	164	275	473	165	164	1847
Bappu	Bf	47	..	18	29	55	51	75	34	..	..	309
Barnes	Bx	13	4	..	10	4	..	..	8	..	..	39
Barry	By	..	..	..	..	..	..	..	..	..	26	26
Benini	Be	12	..	..	..	..	..	14	33	22	20	101

ANNUAL REPORT—Continued.

Observer	Initial	January	February	March	April	May-June	July-Aug.	September	October	November	December	Totals
Berman	Bi	9	..	..	11	..	5	..	..	..	..	25
Bhaskaran	Bg	25	..	65	80	69	32	29	62	..	..	362
Bouton	B	26	85	156	64	96	113	109	..	..	..	649
Bush	Bu	..	6	9	..	..	5	..	3	..	..	23
Brown	Bn	..	9	9	4	6	8	12	4	..	5	57
Carr	Ca	..	..	..	..	..	..	..	91	90	130	311
Chandler	Cd	..	11	11	9	..	18	19	..	..	..	68
Chandra	Ch	95	184	163	100	166	152	244	196	105	116	1521
Cherrington	Cb	6	8	4	13	15	8	24	36	..	13	127
Clement	Cl	6	10	8	7	4	7	15	16	15	20	108
Cunningham	Cu	..	..	..	52	..	..	..	..	..	..	52
Dartayet	Dr	..	..	..	..	..	..	126	..	..	..	126
Ebert	Eb	..	..	6	21	14	8	10	..	44	52	155
Ensor	En	76	85	77	76	58	52	144	306	86	112	1072
Fresa	Fr	..	..	..	..	..	..	80	..	23	..	103
Gaebler	Gb	7	1	4	8	6	7	12	19	..	6	71
Georgetown Coll.	GC	..	..	..	..	12	18	15	55	..	54	154
Gomi	Go	..	.25	..	10	..	46	14	..	15	6	116
Goodsell	Gs	14	..	..	9	..	..	9	..	3	..	35
Greenberg	Gb	..	..	..	1	2	4	4	..	..	..	11
Houghton	Ht	79	86	86	77	65	66	156	236	..	62	913
Hunter	Hu	28	14	..	10	..	..	..	..	..	20	72
Iedema	Ie	39	41	27	27	22	12	18	33	20	21	260
Johnstone	Jn	..	..	..	..	..	..	4	5	3	..	12
Jones	Jo	38	24	15	18	28	26	84	81	54	66	434
Kanda	Kd	99	..	..	122	..	..	32	..	..	..	153
Kohl	Kl	19	22	12	26	..	10	12	..	31	68	200
Kurtz	Kz	..	..	5	23	14	7	12	3	3	55	122
Kurkakin	Kk	168	..	..	41	..	..	..	..	..	..	209
Lacchini	L	129	69	89	98	69	109	199	196	99	110	1167
Leavenworth	Lv	37	18	20	21	20	17	..	..	6	..	139
Lepper	Lp	15	..	..	..	..	..	..	..	..	..	15
Logan	Lg	53	10	58	17	5	4	10	115	119	9	400
Long	Lo	..	..	..	..	..	..	..	57	6	..	63
Morris	Ms	66	28	6	..	..	..	..	..	..	..	100
Miyajima	Mj	..	20	16	4	..	..	2	..	..	..	42
Nakamura	Nk	..	..	..	130	..	..	..	..	..	..	130
Peltier	Pt	298	266	238	295	286	242	499	646	339	340	3449
Pickering	Pi	19	5	..	..	..	..	..	..	..	..	24
Recht	Rh	..	..	..	..	40	..	..	..	..	..	40
Rhorer	Rr	..	..	..	75	..	..	25	..	..	..	100
Rittenberg	Rt	..	..	..	..	16	..	54	16	..	6	92
Rowley	Rw	..	2	..	2	..	..	1	2	..	2	9
Skaggs	Sg	..	..	..	7	3	19	58	56	..	13	156
Smith	Sm	65	71	97	96	64	56	137	304	..	71	961
Spears	Sp	..	..	..	..	..	..	..	11	14	45	70
Vor.-Vel.	Vv	23	..	..	..	..	..	..	..	..	..	23
Watkins	Wk	11	..	21	30	..	28	51	11	44	..	196
Watson	Wa	..	43	14	..	11	45	..	..	..	..	113
White	Wb	..	..	13	..	..	..	21	..	12	..	46
Williams	Wm	..	..	..	..	..	..	..	4	13	..	17
Wilson	Wl	..	..	..	..	..	..	..	10	..	..	10
Yalden	Ya	2	8	5	6	25	15	21	5	6	20	113
14 Others		13	9	1	15	20	..	7	11	1	..	77
Total	75											17,600

SUMMARY OF ANNUAL REPORTS, 1912-1927.

Year	Observations	Stars	Observers
1912	6,180	175	19
1913	12,914	200	20
1914	14,506	255	28
1915	14,724	282	29
1916	11,261	290	30
1917	15,788	332	43
1918	16,112	380	34
1919	8,710	352	53
1920	9,099	399	69
1921	15,513	386	77
1922	16,994	372	72
1923	17,745	441	68
1924	19,484	450	70
1925	23,375	439	68
1926	17,990	434	74
1927	17,600	470	75
Totals	237,895	490	320*

*Approximate number of observers in the published reports of the A.A.V.S.O.

LEON CAMPBELL, Recording Secretary.

November 8, 1927.

COMET NOTES.

By G. VAN BIESBROECK.

Two more comets have been announced since last month; they are provisionally designated as 1927 *h* and 1927 *i*, showing that nine comets have been discovered so far since the beginning of the year.

PERIODIC COMET 1927 *h* (ENCKE).

This is a return of the famous comet Encke, having the shortest known period of 3.29 years, which gives it a unique place in the inner part of the solar system. On account of its high eccentricity (0.85) it comes at perihelion to a minimum distance of 0.33 astronomical units from the sun, which is inside of the orbit of Mercury (mean distance 0.39 from the sun); at aphelion (distance 4.1) it stays well inside of the orbit of Jupiter (radius 5.20).

The present return is the 36th that has been observed since the comet was discovered accidentally by Méchain at Paris in 1786. The name of the German astronomer Encke was attached to this comet because, from the apparition in 1819, his computations established the periodic character.

An enormous amount of numerical work has been done relating to the motion of this comet, which has shown unexplained irregularities. Backlund, director of the central observatory of Russia at Pulkova, has made a special investigation of these anomalies, which consisted for a long time in a shrinking of the orbit such as would be produced by a resisting medium in the path of the comet. But the change stopped about the beginning of this century. Since Backlund passed away the computations have been in the hands of L. Matkiewicz of Pulkova, and it is in the position predicted by him (*Astr. Nach.*, **231**, 11) that the comet was re-

discovered on November 13 by the writer at the Yerkes Observatory.

Two plates exposed for 55 minutes with the 24-inch reflector showed well-defined images of the comet. The plates had been made to follow the predicted motion of the comet. It appeared as a round coma, some 25″ in diameter, with a well-defined nucleus. The integrated brightness was estimated as equivalent to that of a 16M star. The first position

Nov. 13.0552 U.T. $22^h\ 57^m\ 8^s.2$ $+8°\ 54'\ 13''$

indicates a minute correction, —1s.8 and —4″, to the ephemeris, so that the object was within 28″ of the computed place. The accuracy of this prediction shows that there have not been great changes in the motion of the comet since the last return in 1924. The correction to Seagrave's ephemeris, given on p. 413, for the same date is $-2^m\ 6^s$, —31″.6.

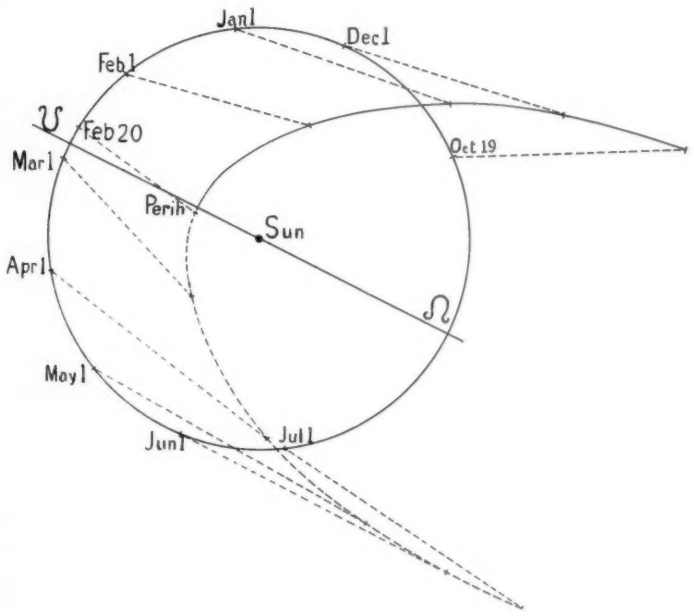


FIGURE 1. ORBIT OF ENCKE'S COMET NEAR PERIHELION, AND ORBIT OF THE EARTH.

After locating the place on November 13, I computed the position backward for October 19 and 20, on which dates I had secured good plates of the field of the comet. Last month I mentioned that I failed to locate the object on these earlier plates, but, knowing the place more accurately, it was not difficult to find a very faint but definite trace of the comet on both dates; the brightness at that time was hardly more than 17M.

In 1924 I had found the first photographic evidence of the comet 92 days before perihelion, the distance from the sun being 1.70 astronomical units. This year on account of the better conditions of visibility the first record comes 124 days before the nearest approach to the sun, which is due 1928 February 20. While the comet has not been observed previously at such a great distance from the sun (2.07 astronomical units), its extreme faintness at this point proves again that there is no hope, even with the largest instruments actually in use, of following the comet all the way around its orbit.

Figure 1 represents the inner part of the orbit of the comet, as well as the nearly circular orbit of the earth. The positions of earth and comet for corresponding dates are connected by broken lines. The orbit of the comet is inclined 12½ degrees to the plane of the earth's orbit; the two intersect along the line marked ☊, and the upper part of the diagram corresponds to the north side, above the ecliptic.

It is at once evident that at the present return the comet will not be favorably placed. It will increase in brightness, but shift more and more into the evening sky until it is lost in the daylight by the end of January. At perihelion next February, it will be almost in line with the sun, being situated one third of the way from the sun to the earth. By the time it becomes again visible in the morning sky, its distance will have increased so much that the brightness will be much reduced.

Matkiewicz's elements are:

$$\left.\begin{aligned} \omega &= 184^\circ\ 55'\ 43\overset{''}{.}2 \\ i &= \ 12\ \ 31\ \ 53.4 \\ \Omega &= 334\ \ 33\ \ 56.4 \end{aligned}\right\} 1927.0$$

$M = 0^\circ\ 5'\ 25\overset{''}{.}70$ Feb. 20, 1928, 0^h U.T.
$n = 1079\overset{''}{.}64628$
$\phi = 58^\circ\ 9'\ 27\overset{''}{.}6$

His ephemeris shows that in December the comet will be about stationary in the southern part of Pegasus:

0^h U.T.		α (true) h m s	δ (true) ° ′	Distance in astronomical units from Sun	Earth
1927 Dec.	2	22 39 31	+5 46.8	1.55	1.12
	6	37 45	5 19.2		
	10	36 49	4 55.8	1.44	1.13
	14	36 30	36.5		
	18	36 46	21.1	1.33	1.13
	22	37 34	9.3		
	26	38 50	4 0.9	1.21	1.12
	30	40 31	3 55.2		
1928 Jan.	3	42 33	52.0	1.09	1.10
	7	44 52	50.3		
	11	22 47 21	+3 49.2	0.96	1.06

COMET 1927 *i*

The following telegram received November 21, in the morning, through the Harvard College Observatory, is the only information at hand, so far, concerning COMET 1927 *i*:

Schwassmann-Wachmann Comet 14^M
Nov. 15.8981 U.T. $1^h\ 32^m\ 12^s$ $+20^\circ\ 53'$
Daily motion, -24^s $+2'$

The names of the observers indicate that the comet was found at the Hamburg Observatory, located at Bergedorf (Germany). It is quite faint, but well situated in the constellation of Pisces, so that further observations are to be expected through which we will learn about the future of this new visitor. Cloudy weather has so far prevented observations at the Yerkes Observatory.

The two other faint comets now observable, comets 1927 *d* (STEARNS) and 1927 *g* (PERIODIC SCHAUMASSE) have shown little change in their appearance since last month's report. The former one has now become a morning object in Coronae Borealis. The ephemeris given on p. 474 is continued as follows from Circular 169 of the Copenhagen Observatory:

0h U.T.	α	δ
	h m s	° ′
1927 Dec. 1	15 51 32	+28 18.9
9	16 0 59	29 16.9
17	10 22	30 23.3
25	19 46	31 38.4
1928 Jan. 2	29 4	33 2.4
10	38 10	34 35.1
18	16 46 51	+36 16.0

On October 28 the correction to the ephemeris was —6ˢ and +4′.7.

Before long, further observations are to be expected on COMET 1926 *f* (COMAS SOLÁ) which is also due in the morning sky. The last observation was obtained here this spring, May 31, and at that date the magnitude was 14. Therefore, the object will hardly be brighter than 15M at this time. The following ephemeris is from Circular 160 of the Copenhagen Observatory:

0h U.T.	α	δ
	h m s	° ′
1927 Dec. 2	14 4 4	—3 46.5
6	9 17	4 15.2
10	14 22	4 42.5
14	19 19	5 8.4
18	24 7	5 32.9
22	28 47	5 55.9
26	33 16	6 17.5
30	14 37 33	—6 37.7

The comet is moving slowly southeastward in the constellation of Virgo.

Williams Bay, Wis., November 23, 1927.

After the above notes were received from Professor Van Biesbroeck the following additional information was received at Northfield through the Harvard College Observatory:

Three new positions of Schwassmann comet were found at Bergedorf as follows:

1927 U.T.	R.A.	Dec.
	h m s	° ′ ″
Nov. 15.8983	1 32 14.2	+20 54 42
Nov. 18.8506	1 31 10.7	+20 46 47
Nov. 22.7693	1 29 53.5	+20 36 25

Preliminary elements computed by Moeller are:

T = 1926 May 3.37
ω = 328° 23′
Ω = 331 38
i = 10 5
q = 2.805

METEOR NOTES.

By CHARLES P. OLIVIER.

Good weather at several stations from which reports have arrived marked the annual return of the Orionid meteors. Thanks to this and the energy of some of the members of the A.M.S., a very gratifying number of meteors was observed at 5 stations by 7 observers. Nevertheless, it seems strange that so many others apparently made no effort whatever to observe, despite urgent communications by the writer on the importance of getting full data upon this stream. One other observer, Mr. Lawrence, reported being ready, but continuous clouds and rain prevented results. Nothing has been heard from the sixty-odd remaining members.

Mr. R. M. Dole, of East Lansing, Mich., reported by a letter of October 25 that he had seen a very rich return, being favored by brilliantly clear nights. Up to the date of writing he had recorded 280 meteors with the maximum on October 22. He adds that the shift of the radiant was unmistakable from day to day.

Mr. Sterling Bunch and Mr. O. E. Monnig, at Fort Worth, Texas, made extensive observations on October 19 and 23. They observed together, and hence about half of their numbers were duplicates. Such observations are most valuable for a comparative study as to how two observers plot the same object, and this eventually will be carried out for these sets of observations. On October 19 from 12:37 to 17:37, with an excellent sky, Mr. Bunch plotted 76, Mr. Monnig 64 meteors. They also saw 21 others. On October 23, from 11:23 to 15:43, with some passing clouds, their respective numbers were 60 and 50. Enough work has been done here on their maps to see that several good radiants, besides the Orionid, will come from these records. Attention may again be called to the fact that Texas is rapidly forging ahead in the work reported, and we are having numerous inquiries from others in that state who are thinking of joining the A.M.S., or have already done so.

Mr. C. M. Pegues, at Georgetown, Ky., observed on October 20 from 11:55 to 13:30, with a clear sky until nearly the end; and on October 22 from 12:05 to 14:05 with a clear sky. The first night he recorded 27, the second 39 meteors, a very large proportion being Orionids. Other radiants were also active. We particularly needed an active observer in Kentucky, and these observations from Mr. Pegues are very welcome.

In Virginia observations were made by C. P. Olivier at the McCormick Observatory on October 20, 22, and 23. On October 20 from 11:35 to 15:40, with a fairly clear sky, 51 meteors were recorded; on October 22 from 12:00 to 16:00, with an excellent sky, 59 meteors; on October 23 between 15:03 and 17:10 (actually observing 90 minutes) with a clear sky, 24 meteors. On October 25 in a 12 minute watch at about 14 hours, 4 meteors of which 2 were Orionids were seen, proving the shower still active on that date. On October 22, Mr. F. L. Bradley, assisted by Mr. H. L. Keller, observed at Staunton, Va., hoping to get meteors, seen also by the writer, for parallax. His position in the city was unfavorable due to lights. A few meteors only in the selected region were bright enough for the purpose and were plotted by Mr. Bradley. Mr. Keller counted 35 from 12:45 to 15:00.

The results of the writer show a daily shift of the Orionid radiant. Many other minor radiants in and near Taurus were active, fully confirming results by

the rest of our observers. On the whole, this return of the Orionids was better observed in America than usual and, when the radiants have been carefully worked out, we should have something of real value to add to our knowledge of this important stream.

Attention should be called to the practice in all A.M.S. publications of giving all dates according to the old astronomical day which starts at noon, not the previous midnight. To change our records to the new system would be a complicated and useless procedure, and the writer has no intention of adopting the new system in future publications, in this way keeping them all homogeneous.

Efforts are being made to secure further data on a brilliant fireball seen from North Carolina and Kentucky on October 23, and a most remarkable object reported from Trinidad and St. Lucia, B. W. I., on October 7. If any reader can possibly supply information on either of these objects, it would be most gratefully received.

November 19, 1927. Leander McCormick Observatory, University, Va.

GENERAL NOTES.

Dr. Otto Struve, of the Yerkes Observatory was promoted to an assistant professorship of Astronomy, from July 1, 1927. He became a citizen of the United States on September 26.

Professor F. R. Moulton has been elected a member of the executive board of the National Research Council. (*The American Mathematical Monthly*, November, 1927.)

Assistant Professor L. A. H. Warren has been promoted to a full professorship of mathematics at the University of Manitoba. (*The American Mathematical Monthly*, November, 1927.)

Mr. Harry H. Plaskett, of the Dominion Astrophysical Observatory at Victoria, B. C., has been appointed lecturer in astrophysics in Harvard University, beginning February, 1928. A leave of absence for one year has been granted Mr. Plaskett by the Canadian Government.

Mr. N. T. Bobrovnikoff received the degree of Ph.D. at the June convocation of the University of Chicago, after nearly three years of graduate work at the Yerkes Observatory. His thesis was entitled, "Investigations on the Nature and the Physical Properties of Comets." He received the appointment as Martin Kellogg Fellow at Lick Observatory for the period beginning September, 1927.

Astronomy by Radio.— Those who are within the range of station KTAB at Oakland, California, have the opportunity of hearing "Science Chats and Lectures on the Romance of Astronomy" each week day, except Saturday, from 10:30 to 11:00 A.M. through most of November and a part of December. These talks are given by Mr. Earl G. Linsley, director of the Chabot Observatory and professor of astronomy in Mills College, and constitute a part of an extensive broadcasting program by Mills College.

John A. Brashear Statue Unveiled.—A life-size bronze statue of the late Dr. John A. Brashear, skilled technician, maker of numerous large telescopes and astronomical instruments, and the founder of the new Allegheny Observatory, has been placed in the rotunda of the Observatory and was unveiled on November 24, the anniversary of his eighty-seventh birthday. The statue is the work of the sculptor Mr. Frank Vittor, and is a gift to the University of Pittsburgh from a number of Dr. Brashear's life-long friends.

New Research Fellowship at the Harvard Observatory.—An endowed fellowship for advanced astronomical students has been provided at Harvard through a gift to the Observatory from Mr. George R. Agassiz, chairman of the Observatory's Visiting Committee. The holder of the fellowship is expected to carry on his researches at the Harvard Observatory, and preferably will be a candidate for a doctor's degree in Harvard University. The annual stipend will be not less than one thousand dollars.

The present holder of the Agassiz Research Fellowship is Mr. Frank S. Hogg, B.A., Toronto, who has made investigations at Harvard during the past year in stellar spectrophotometry.

The Southern Station of the Harvard Observatory.—The Boyden Station of the Harvard Observatory, which was near Arequipa, Peru, from 1891 to 1927, has now been located at Mazelspoort, fourteen miles from Bloemfontein in the Orange Free State, South Africa. During the time necessary to build a road to the permanent site, install water and electric lines, and construct the permanent buildings, two or three of the smaller telescopes will be erected temporarily at Mazelspoort. Dr. J. S. Paraskevopoulos is in charge of the new installation of the Boyden Station and of the astronomical observations.

It is requested that all publications and communications formerly sent to the Station in Peru now be sent directly to the following address: Boyden Station, Harvard Observatory, Bloemfontein, South Africa. (*Harvard College Observatory Bulletin,* No. 851.)

Bequest for a Professorship in Astronomy.—By the will of Annie Downing Willson, widow of the late Robert Wheeler Willson, provision is made for an endowment trust fund of $150,000, for the benefit of Harvard College, under conditions as set forth by Mrs. Willson in her will, as follows:

"The net income is to be paid to Harvard College to be used to support a professorship of applied astronomy, including navigation, at the College itself as distinguished from the Astronomical Observatory. The gift is made to carry out a very earnest desire and wish of my husband that applied astronomy for the benefit of many students may continue to be taught at Harvard as heretofore by him. This professorship is to be called and known as the Robert Wheeler Willson Professorship of Applied Astronomy. The teaching by such professor shall be done for the most part by laboratory methods and not by lectures."

In the event that the gift is not accepted by the University, provision is made for the income to go to the support of Harvard students who may wish to study applied astronomy elsewhere, preferably at the School of the Royal Geographical Society in England. In the event of no such students, the income is to be used for the aid of students studying other applied sciences at Harvard University.

Sir Isaac Newton Commemoration.—An interesting and significant series of meetings was held at the American Museum of Natural History in New York City, November 25 and 26, 1927. The session was in commemoration of the bicentenary of the death of Sir Isaac Newton and was under the auspices of The History of Science Society in collaboration with The American Astronomical Society, The American Mathematical Society, The American Physical Society, The Mathematical Association of America, and various other organizations.

The program of the meetings consisted of papers appropriate to the occasion.

In connection with the session there was held an exhibit consisting of books, portraits, medals, letters, and documents relating to Newton and his achievements. There also was included a collection of portraits and letters of prominent scholars who prepared the way for his discoveries; of his best known mathematical contemporaries; and of numerous writers of special prominence who continued his labors. The collection numbered several hundred important items.

A more detailed report of the session will be given in the next issue of POPULAR ASTRONOMY.

Nova. — A cablegram received November 20 from Professor Strömgren announces the discovery of a tenth magnitude nova by Schwassmann and Wachmann on November 18.9583 in the following position:

R.A. $5^h\ 15^m\ 12^s$ Dec. $+16°\ 38'$

The following observations of the nova have been made on Harvard plates by Miss Cannon:

1927		Mag.	1927		Mag.
Sept.	11	[11.7	Oct.	16	7.4
	25	8.2		20	7.6
	29	6.2		26	8.2
	30	6.0		29	8.4
Oct.	5	6.4	Nov.	4	8.5
	6	6.4		19	9.4
	9	7.2		20	9.7
	10	7.2			

No object as bright as the fifteenth magnitude appears on Harvard plates of earlier years.

Spectrograms made by Mr. Hogg with the 24-inch reflector on November 20 show the hydrogen lines bright and the band 4640 five times as bright as Hβ.

HARLOW SHAPLEY.

Harvard College Observatory Announcement Card 37. November 21, 1927.

Occultation of B. D.—3°5697 by Jupiter.—A communication from Dr. Seth Nicholson and R. S. Richardson states that positions of Jupiter have been measured on several photographs taken at the Mount Wilson Observatory during the past two months using stars of the San Fernando and D'Alger Catalogues. These positions indicate the following corrections for the occultation of B.D.—3°5697 by Jupiter on December 7 as predicted in the B.A.A. Handbook for 1927:*

	Time	Position Angle
Immersion	$+17^m$	$+7°$
Emersion	$+\ 7^m$	$-7°$

HARLOW SHAPLEY.

Harvard College Observatory Announcement Card 38. November 23, 1927.

---

*See November issue, p. 520.

The Mathematical Association of America.—The twelfth annual meeting of the Mathematical Association of America will be held at Ward-Belmont School, Nashville, Tenn., on Thursday and Friday, December 29-30, 1927, in affiliation with the American Association for the Advancement of Science and the American Mathematical Society. The Society will hold sessions on Tuesday afternoon to Thursday morning inclusive, for the reading of papers. At one of the sessions Professor James Pierpont will deliver an address on "Mathematical rigor, past and present." On Thursday afternoon there will be held a joint session with Section A of the American Association and with the American Mathematical Society. The program will consist of the retiring address on "The notion of probable error in elementary statistics" by Professor E. V. Huntington, as vice-president of Section A, the retiring address on "The human significance of mathematics" by Professor Dunham Jackson as president of the Mathematical Association, and an address on "Some philosophical aspects of mathematics" by Professor Arnold Dresden as a representative of the Society. During the week the fifth annual Josiah Willard Gibbs Lecture of the Society will be given by Professor E. W. Brown as a general session of the American Association, the subject being "Resonance in the solar system." At the two sessions of the Mathematical Association on Thursday papers will be read by Professor Archibald Henderson on a subject to be announced, Professor A. R. Crathorne on a subject connected with statistics, Vice-Principal William Betz on "The re-organization of secondary mathematics," Professor Jewell Hughes on "Mathematics in the junior colleges," Professor J. Arthur Harris on "Mathematics for botanists," and Professor E. P. Lane on "Present tendencies in projective geometry." The full program will be sent to members as usual early in December. (*From a circular of information issued by the Secretary.*)

American Astronomical Society.—On the invitation of Yale University, the thirty-ninth meeting of the Society will be held in New Haven, Connecticut, December 29 and 30, 1927.

The New York, New Haven, and Hartford Railroad runs through New Haven. There are frequent trains from the Grand Central, New York. The running time is about an hour and three-quarters.

Headquarters will be at the Faculty Club, 149 Elm Street, on the north side of The Green. It is a little more than a mile from the railroad station, and can be conveniently reached by taxi or by car lines B, Q, and J, which pass the railroad station going to the right. Cars B and Q take you to the corner of Elm and Temple Streets, almost in front of the Faculty Club; and car J to the corner of Elm and Church, a short square away from the Club.

The meetings of the American Section of the International Astronomical Union will be held on Saturday, December 31, at which all members of the Society are invited to be present. Those intending to remain for these meetings on Saturday are requested to so state on their reply cards.

RAYMOND S. DUGAN, *Secretary.*

Princeton University Observatory,
Princeton, New Jersey, Nov. 3, 1927.